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ABSTRACT

This proceedings of the International Association of Technological University Libraries (IATUL) contains the opening address by IATUL president Nancy Fjallbrant and the full text of the following papers: "Building Info-Skills by Degrees: Embedding Information Literacy in University Study" (Wendy Abbott and Deborah Peach); "UQ Library's First CIS: Towards Customising Information Services at the University of Queensland Library" (Ruth Foxlee and Karen Borchardt); "Education for Information Literacy in Czech Technical Universities" (Vladimir T. Borovansky); "Information Literacy for the Skeptical Library Director" (Patricia S. Breivik); "Forward with Imagination: Innovative Library Client Services for the 21st Century" (Alan Bundy); "After the Fireworks: Opportunities and Directions for University Libraries" (Alex Byrne); "Watch Our Lips! New Skills and Services for the Knowledge Age" (Penny Carnaby); "The Yields of Growing Professional Partnerships" (Sandra Lawrence and Pauline Fountain); "Creating Information Structures that Work for the New Millennium" (Heather Gordon); "Facing the Challenges of Transition: The Next Generation Library" (Nancy V. Green); "Virtual Libraries: Interactive Support Software and an Application in Chaotic Models" (Anthi Katsirikou, Christos Skiadas, Apostolos Apostolou, Giannis Rompogiannakis); "The Academic Library in the 21st Century--What Need for a Physical Place?" (Helen King); "Navigating the Information Society" (Joyce Kirk); "Value Not Virtual--One Library's Response to the Virtual Campus" (Sue McKnight); "Does the Virtual Campus Demand a Virtual Library? Library Leadership Response to Big Hairy Audacious Goals" (James G. Neal); "Virtual Libraries: Service Realities" (Jan Novak); "In Technology We Trust--A Perspective from up North" (Irma Pasanen-Tuomainen); "The Virtual Campus: Impact on Teaching and Learning" (Janice Rickards); "Strategies for Working with Library Staff Members in Embracing Change Caused by Library Automation" (Murray Shepherd); "Information Literacy--Collaboration between the University of Pretoria and the

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Potchefstroom University for Christian Higher Education" (Jane Elizabeth Thompson); "Information Literacy in Electronic Environments Fantasies, Facts, and Futures" (Ross Todd); and "Developing IT Literacy Levels among Library Staff in a Networked Environment, at the University of the Witwatersrand (WITS), Johannesburg, South Africa" (Julie Wilcocks and Clare Walker). Abstracts of four additional papers are also included. (MES)

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IATUL

Abstracts, Fulltext Documents and PowerPoint Presentations of Papers and Demos given at the 2000 IATUL Conference

Queensland University of Technology, Brisbane, Queensland, Australia 3rd - 7th July, 2000.

"Virtual Libraries: Virtual Communities"

ED 447 820

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IATUL

Opening Address by the President of IATUL

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This 21st IATUL Conference marks a very important stepping stone for our organisation. This is the first conference that the International Association of Technological University Libraries has held in Australia. There was, however, a one-day IATUL Seminar, at the Royal Melbourne Institute of Technology in 1988, as a pre-seminar to the 54th Annual IFLA Conference.

When I first visited Australia in 1981, there were just a few Australian members of IATUL – mostly from the Institutes of Technology. We are very pleased to see how the number of Australian members has grown steadily in recent years. Today I would like to extend a special welcome to the new IATUL members who are attending this conference. We hope that you will come to many IATUL events in the future and establish new and lasting contacts.

The exciting theme of this annual conference - *Virtual Libraries: Virtual Communities* is very appropriate to the start of a new millennium, with the focus on the use of networked communication and interaction. Indeed this is particularly relevant in Australia, where the use of advanced communication technology has played an important part in education and training programmes at all levels.

I feel particularly happy to be back again at Queensland University of Technology, here in Brisbane, as both my husband and I happened to be giving lectures, at the exact hour, when there was an official change of name from QIT – Queensland Institute of Technology, to QUT – Queensland University of Technology! I share many happy memories of cooperation with Tom Cochrane and Gaynor Austen – both of whom have been valuable members of the IATUL Board, and with many Australian colleagues working in the field of information literacy and distance learning. I am really looking forward to all the sessions and to listening to the keynote and other speakers.

I am also looking forward to the splendid social programme, which has been arranged for us. Again, I know from personal experience, which I share with some of my Swedish colleagues, that we will be taken care of truly well. Finally, I would like to thank Gaynor Austen and all the members of the Local Organising Committee for all their excellent work in preparing for this IATUL 2000 Conference. I am sure that all the participants will have a wonderful time in Brisbane, with many opportunities to interact and discuss strategies and plan for the future.

I now declare the IATUL 2000 Conference - *Virtual Libraries: Virtual Communities* – now open!

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IATUL

Building Info-skills by Degrees: Embedding Information Literacy in University Study

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Introduction

Late last year teaching staff at Griffith University participated in a symposium entitled 'Spotlight on Generic Skills & Flexible Learning'. This event brought together academic staff as well as library staff, learning advisers and other support staff interested in teaching and learning issues. The discussion was based on the premise that the University has a responsibility to ensure that its courses emphasise broad educational values and 'produce highly sought after graduates with globally applicable skills for the international market'[1].

It was acknowledged that the University consistently scores very highly with graduates for its development of generic skills. However at the same time staff expressed concern at the challenge of developing more flexible, student-centred learning environments that have generic skills embedded across all programs[2]. As a result there has been much debate in the University about which skills are important, how they will be acquired and how they could effectively be built into the curriculum. One outcome of these discussions is the project described in this paper. What follows is an overview of the project and a discussion about the integration and development of information literacy as a generic attribute in the curriculum and some suggestions on ways forward.

The Griffith Graduate Project

In April 1999 a group of academic and support services staff approached the Deputy Vice Chancellor and Pro-Vice-Chancellor, Information Services with two proposals to progress the University's generic skills agenda. The first initiative involved an audit of generic skill development across the University. The intention was to take a snapshot of current practices and to identify examples of innovative approaches to embedding generic skills. The second proposal was for a pilot project with first year students in the School of Applied Psychology to implement a process that would help students develop their generic and professional skills and capabilities across a degree program. Both proposals received strong support but it is the second initiative, known as the Griffith Graduate Project, that is the focus of this paper.

The Griffith Graduate Project was conceived as a student-centred process which would facilitate the development of generic and professional skills over the life cycle of an undergraduate degree program. With funding from the University's Quality Enhancement Committee and the Division of Information Services we set about the development, implementation and evaluation of three student-centred strategies.

The first strategy involved a series of workshops with approximately 110 first year students in the School of Applied Psychology (Mt Gravatt). We captured student attention by identifying the generic skills involved in first semester assessment tasks. As part of this awareness raising process, students were asked to complete a self-assessment task to help them identify their strengths and weaknesses. Students were asked to rate themselves across nine generic skills: self-management skills, interpersonal skills, problem solving and decision-making, analysis and critical evaluation, adaptability and learning

skills, teamwork, oral communication, information skills and written communication. They were also asked to consider a self-managed process of goal setting. Attention was drawn to resources such as the Library, Learning Assistance Unit and Careers Service that could help them enhance their capabilities.

In the self-assessment task, students rated their generic skills across seven dimensions and for information literacy, most students rated their skills as better than average. See Table 1 for a summary of the results of the self-assessment task for the cohort on information skills. Despite being relatively confident about their information skills, 15 students set personal goals for improvement in this area. This probably reflects the importance placed on acquiring good information skills throughout the workshop series as well as the ready availability of training opportunities to improve skills in this area. Following the awareness raising process, approximately half the students in the cohort signed up for voluntary library research workshops on catalogue, database and internet searching. Interestingly, very few of these students availed themselves of the self-paced Library Research Tutorial that is readily accessible via the world-wide-web. This tutorial teaches introductory, generic, library research skills and is already embedded in many first year courses.

Table 1 Students Self-Assessment on Information Skills

Information Skills Assessed	Average of Students Self-Assessment Rating on Scale 1-5
I use a variety of strategies (eg reading lists, independent searching of library catalogues and databases) to find information for my university assignments.	3.7
I draw on and make effective use of the skills and knowledge of the people around me.	3.6
I feel confident working with data and numbers and can use this information to identify trends and patterns.	3.5
My computer skills include the ability to use a range of software applications (eg. Word processing) and the capacity to use file management practices (eg. saving and printing my work).	3.8
When analysing information I am able to evaluate what to use and what to discard.	3.7
I draw conclusions based on my sources and am able to discuss and share these using specific examples.	3.7
In my university work, I am able to analyse an assignment topic to identify what information I need.	3.7
Number of students who responded = 109	

The second strategy of the Griffith Graduate Project was the development of a web-based resource directory. At the time of writing, the directory is still under construction however the intention is that it will provide access to a range of flexible resources that will support students in their developmental goals.

The third student-centred strategy, which students will progressively develop over the life cycle of their degree program, is The Professional Portfolio. This is an electronic resource file that will enable students to organise and track their experiences and achievements and to critically reflect on their current level or stage of development. It is envisaged that this portfolio will become a useful tool in job seeking strategies such as resume writing, networking and job interviews. Some suggested headings in the portfolio include:

My guiding values and principles
My career direction and goals
My job relevant experiences
My competence as a member of a team

My capability to solve unfamiliar problems
My information seeking strategies
My capacity to work independently/without supervision
My ability and willingness to provide leadership
My effectiveness as a learner
My capacity to handle change[3]

Embedding Information Literacy in the Student-Centred Learning Environment
Information literacy education at Griffith University has had a high profile for several years with a variety of delivery models in place. The approach Griffith has adopted is comparable to university practices across the world[4]. For example, the self-paced *Library Research Tutorial* has become a compulsory element in some first year subjects and this is supplemented by a range of discipline specific information skills sessions designed to meet student needs at strategic points in a subject or course. In addition, the Library offers a range of generic information skills training courses throughout the year that provide a combination of hands-on and demonstration sessions.

These models of delivery ensure that the majority of students receive basic information literacy skills training at the beginning of their studies with a smaller number receiving more advanced or discipline specific training during the course of their studies. However, because opportunities for students to progressively develop information skills across a degree program have generally been limited, skill development has been fragmented and a more holistic model for embedding these skills in the curriculum is needed.

Consequently, an important aspect of the Griffith Graduate Project has been to encourage commitment and to raise awareness amongst academic staff of the need to teach, practice and assess generic skills across the life cycle of degree programs in the School of Applied Psychology. One of the strategies adopted was to analyse the assessment tasks required of students in their first semester and to highlight the generic skills being called upon to complete those tasks. This analysis was carried out by the Project Officer in consultation with academic staff and through the process both students and academic staff were made more aware of generic skills being taught, practiced and/or assessed.

As a result of this analysis, one lecturer set first year students the task of carrying out a database search using PsychLit. Students performed the search with guidance from tutors and many students also approached library staff for individual assistance or voluntarily attended a workshop. This incident illustrates how information literacy can be taught, practiced and assessed as a generic skill within the curriculum and we need to build on these opportunities to work collaboratively with academic staff to ensure that information literacy is successfully embedded in the curriculum.

An ongoing challenge for the project will be to ensure that students and academics appreciate the need for progressive development of generic skills. Merriam, LaBaugh and Butterfield[5] have proposed comprehensive information literacy standards for students majoring in psychology. These standards can only be attained across the course of the degree program and students need to be made aware of the breadth and depth of skills they should aim to acquire. Students also need the means to chart and record their progress and this will be provided in the future by the third main strategy of the project, the Professional Portfolio.

It should be noted that while all professionals need information to carry out their jobs, different employment environments affect how professional practitioners access information. Students need to be prepared for the reality of where and how they are likely to find information in their future professional roles. In a study of the information needs of four professions, Hammond and Mitchell[6] identified that except for those in corporate settings, most professionals do not use libraries even though their need for information may be great. This study found that practicing psychologists typically do not have access to a library. They must therefore possess skills to access information sources independent of libraries. A future challenge for the project will be to provide transition strategies that will assist psychology students to develop alternative information finding skills to use when they enter the profession.

In summary, the Griffith Graduate project has attempted to develop a holistic and integrated approach towards the development of information skills as well as other generic skills. In the project, information skills are positioned with a range of generic skills that students should aim to develop and improve over the course of their degree program. The strategies we've described are aimed at encouraging students to maintain an ongoing process of skill development as they prepare for their future professional roles. It is argued that by focussing on the importance of acquiring these skills and demonstrating the links to future employment, students are more likely to appreciate information literacy as a valuable skill leading to success in study and professional life. It is our hope that as a result, information literacy programs will no longer be viewed as a "boring but necessary evil".

Conclusion and Future Directions

An important aspect of this project has been the collaboration between librarians, learning advisers, academic staff, careers counsellors and academic staff developers. Instead of focussing on what makes us different we've been motivated by shared concerns about the quality of the learning environment, retention rates, graduate capabilities and graduate outcomes. We believe that the strategies we've developed have the potential to make a significant contribution to the learning environment. Success however is dependent upon the commitment and support of students, staff and employers who must perceive the process as relevant and as adding value. The long term aim is to have generic skill development integrated into all degree programs and to develop more effective, timely and coherent ways of providing a range of student support services. However in the short term our aim is to improve the tools that we've already developed and to consider ways of extending the project to include other discipline areas.

Further funding to continue the work of the project has recently been approved by the University's Quality Enhancement Committee. Phase two of the project will complete implementation of the three student-centred strategies. This will involve developing a web-based package that integrates the component tasks of student self-assessment (the student self-assessment tool), the accessing of learning resources (the Resource Directory) and the progressive self-evaluation of student progress towards goals (the Professional Portfolio). The student-centred strategy will be complemented by creating and delivering a coherent program of professional development that will enable teaching staff to become confident in integrating generic skills in the curriculum.

At Griffith University, the profile of information literacy as a fundamental generic skill has been enhanced through the Griffith Graduate Project. In this 'Information Age' information skills must increasingly be seen as vital to success in personal and professional life. A challenge now for librarians at Griffith is build on this profile and to have information literacy recognised in the University's official list of our graduates' desirable attributes.

Acknowledgments

Thanks go to our co-collaborators at Griffith University: Alf Lizzio and Keithia Wilson, School of Applied Psychology, Gay Crebert, Griffith Institute of Higher Education, and Olga Lipsky, Library. We give special thanks to our ever-patient and resourceful Project Officer, Lyn Roubos from Student Services. Input and feedback from students and staff of the School of Applied Psychology is gratefully acknowledged. The project was made possible by a grant from the University's Quality Enhancement Committee.

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IATUL

The GAELS project: effecting strategic change through a collaborative service review

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ABSTRACT

GAELS is a collaborative project, based at the Universities of Glasgow and Strathclyde and funded under the Scottish Higher Education Funding Council's Strategic Change Initiative. The project aims to investigate the feasibility of providing a collaborative electronic information service in support of engineering research at the two universities, and to develop an online CAL package in advanced information skills for research students and staff. This paper reports on the progress made against the first of these aims and discusses the likely impact of the emerging proposals.

It is anticipated that the impact of the project will be wide-ranging and substantive, delivering an innovative, effective and sustainable information services to engineering researchers at Glasgow and Strathclyde, and in the longer term to researchers in other disciplines and at other universities across Scotland.

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IATUL

UQ Library's first CIS : Towards Customising Information Services at the University of Queensland Library

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How well do we know our clients, our students, our staff, our customers, and our patrons? Does it matter what we call them? Perhaps not, but it does matter whether our services are meeting their needs. Are they suffering from total information overload? Do they use the new databases, ejournals and alerting services, or are we flooding them with sources of information too overwhelming? How can a Library provide services that give people some way of filtering meaningful information from the vast ocean of data out there? To explore these questions the University of Queensland Library (UQL) conducted a pilot study to investigate how our leading edge researchers and their postgraduate students gather information and what services and/or collections would create the ideal research environment for them. The project was exploratory in nature.

Setting the scene - the University of Queensland Library
The University of Queensland is the largest and oldest university in Queensland. It was established in 1909 and officially founded in 1910. The University today has a student body of 28,400 students, with postgraduates making up almost 6,000 of the students. One in 15 students is from overseas with over 80 countries represented. There are 4,500 staff employed – a mixture of academic, research and general staff.

The University is spread over 3 major campuses at St Lucia, Ipswich (approximately 30 minutes away) and Gatton (approximately 75 minutes away). Other locations include teaching hospitals and health centres, veterinary science centres, agricultural science farms, marine research stations, physics research stations, seismographic stations and a mine.

To cater to all these groups the University of Queensland Library (UQL) has 14 branches. The three largest are the Social Sciences & Humanities Library, the Dorothy Hill Physical Sciences and Engineering Library and the Biological Sciences Library, which are all on the main St Lucia campus.

The Library or as many now refer to it, the Cybrary, employs 250 staff (EFT), has an annual budget of $22 million, houses over 2 million volumes, 9,500 electronic books, 11,000 videos, 22,000 current serials, over 6000 of them available electronically, and 250 networked databases. UQL has about 1000 computers for customer use, few of whichever sit idle.

The Library services range from loan and inquiry services to information skills training programs and electronic document delivery. In 1999, 34,600 students attended information skills training sessions. The first page of the Cybrary website on one day in May of this year had 28,000 hits, 80% of which came from outside the Library's branches. Included on the Cybrary home page are direct access to the catalogue, internet services, databases, FindIts and UseIts. FindIts are introductory guides to various subjects for example; Education giving information links for an undergraduate starting the subject. Starting points include key books, journals and Internet resources on the subject. UseIts are detailed directions to other resources, such as databases, table of contents services and different referencing systems used by the University. The Library provides traditional reference and inquiry services in all branches and also a virtual service, Ask a Cybrarian, on its website. To further meet the needs of academics and students, a Liaison Librarian is appointed to each Department. Liaison Librarians take responsibility for communicating between staff and postgraduate students of the Department and the Library. Departments too, have assigned academic library liaison officers, who act as a primary contact

for their Liaison Librarian. For students of the University the Library also maintains an AskIT service both physically and virtually. This service helps students with a range of IT problems, and since its inception at the beginning of this year has been heavily used not just to solve IT problems but also to meet IT training needs.

Origins of the Customised Information Services Group

Late in each academic year UQL conducts a series of planning sessions that involve staff from all levels. These sessions provide staff with the opportunity to debrief at the end of what is always a busy year and to establish priorities for the coming year. It was from the planning sessions at the end of 1998 that the Customised Information Services (CIS) Priority Group emerged. In seeking to identify a target group we were informed by the strong research presence at the University. The CIS Group, consisting of liaison, technical and IT section staff, was formally convened in July 1999 to investigate how the Library could target its services and collections to support leading edge researchers. This preliminary investigation into customised information services was guided by several key terms of reference:

- Identify leading edge researchers
- Find out how leading edge researchers gather information to conduct their research, including identification of research grants and preparation of grant proposals
- Explore with the researchers how the Library fits into their research process
- Explore whether current library services meet research needs of the target group
- Trial a customised search portal
- Make recommendations on future directions in the marketing and delivery of targeted collections, customised information services and advisory consultancy services.[2]

Methodology

The University of Queensland is a large institution, with a strong research profile. Our first challenge was to select from the plethora of researchers, amongst all the disciplines, a group that would be meaningful. It was about this time that the winners of the Inaugural University of Queensland Foundation Research Excellence Awards were announced. This award recognised outstanding performance and leadership potential amongst research staff. All of the researchers had been selected on the basis of outstanding achievement early in their research careers. The achievements of this group encapsulate the degree of excellence pursued by the University of Queensland. This presented us with a ready-made group, of interest both because of their acknowledged excellence in research, but also because their success came early in their careers. Would this new generation of researchers exhibit different needs and skills? Could their success be related to the use of the newly available technologies? The CIS group felt that gaining an understanding of how these researchers conducted their business and hearing their thoughts on the value of a customised information service, would provide vital clues on how to best support the research aims of the University. Not all award winners were available to participate in the project and some research staff from other faculties were approached. The decision on whom to approach was informed by the need to achieve a balanced representation of arts/humanities and science faculty research needs. The disciplines represented in the final group included Chemistry, Chemical Engineering, Earth Sciences, Education, Human Movement Studies, Physiology and Pharmacology, and Studies in Religion. Primarily the three largest branch libraries serve all of the disciplines. It was decided to extend the group, numbering seven, by asking each researcher to nominate a postgraduate student whom he/she supervised. Including the postgraduates provided an opportunity to determine any differences there might be between the researchers' and their students' perceptions of the information environment, the Library in particular and any differences there might be in the ways they conducted their research.

A literature review was conducted on the information needs of academic researchers [3]. We looked at research into patterns of scholarly communication, the relationship between discipline and information-seeking behaviour, and what implications these might have for library services and collections. The literature review contributed to the formulation of the questions posed at the focus group sessions and to the development of a survey tool to assess the research habits of the leading edge researchers. (See Appendix 1). Members of the CIS group were assigned to individual researchers, and the University Librarian formally invited each researcher to participate in the project. Two focus group luncheons were held, the first for the leading edge researchers and the second for postgraduate students

nominated by the researchers. During the focus group sessions questions were asked about information services the library should offer if money were no object; services seen or heard about at other institutions that they would like provided at the University of Queensland Library; services they might be willing to pay for, and services they would keep, improve or extend. There was also a demonstration of *"myCybrary"* a customisable portal currently under development at the Library. To follow-up the focus group sessions, interviews with the leading edge researchers were then conducted using the survey tool.

myCybrary

The development of the myCybrary personal portal, demonstrated to both the researchers and their postgraduate students, has occurred as a result of the Library's marketing focus and changing student and research needs. These had indicated a growing requirement for customised service delivery. The y generation or Dot com as they are becoming known wants information quickly and easily. The project MyLibrary@NCState provided the Library with a model to start from. The goal of myCybrary was to give library customers a seamless web interface which would enable them to tailor the library's services to their own needs. They would be able to view a 'slice' of the Library website, and easily obtain a selection of resources of their choosing that best suited their research interests. Logins and passwords would be self-assigned, with each user developing his/her own profile using a series of screens to select resources from lists of Databases, Library FindIts, selected Electronic Journals and Library Services. Customers would use the Library's existing website structure to make global selections by discipline, and then personalise pages further by selecting only certain databases from within a particular grouping.

***Screen-shot 1** - Login & Authentication*

***Screen-shot 2** - Final Customised Interface & Profile*

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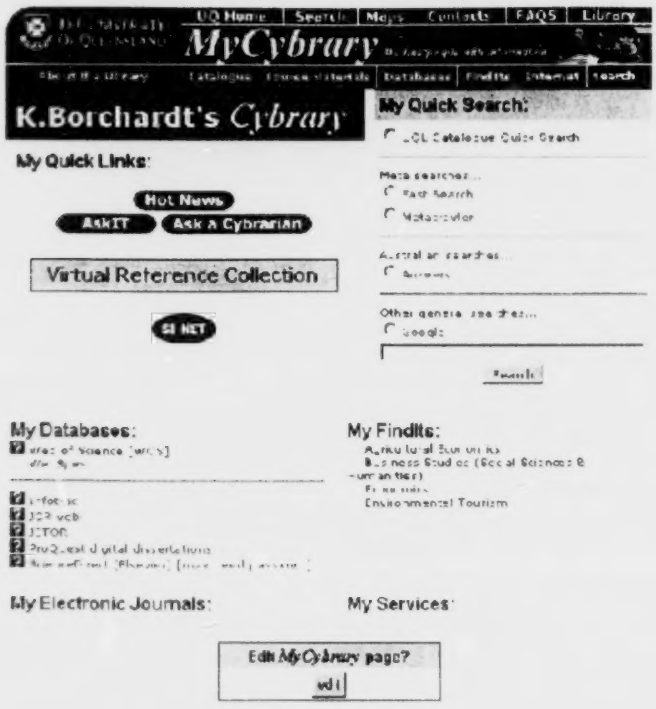

Results

The CIS group members agreed that the project was a very valuable learning experience. It provided insights into how leading edge researchers approach their work, and the extent to which they valued the library services provided by UQL.

What did we find?

Customisation

Despite the fact that the members of this group were all at an early stage in their research careers, they took a broad view of customisation. The researchers did not describe their ideal library service in terms of electronic service delivery only, but expressed a desire for customised physical library spaces and even customised services delivered in the time honoured personal manner. Some of this supported earlier work done before refurbishment projects, which have been designed around customer needs. In many ways their descriptions of what services the Library should offer if money were no object were quite modest. Indeed several services they mentioned were already available. Lack of knowledge had been discovered in other work carried out at the University of Queensland Library. Focus Groups with researchers in the Humanities conducted as part of the Australian Libraries Collection Task Force (ALCTF) projects found some lack of awareness of procedures, services and information management training opportunities available at UQL. UQL is not alone in this. Despite the plethora of publications, website information and classes, many of our users lack basic knowledge of services available.

Electronic Information

Online information was either valued, or treated with some suspicion, depending on its source: unmoderated email discussion lists were not afforded much value for example, whereas recognised government websites were valued. There was also a mistrust of current web search tools available for the researcher on the Internet. The current momentum in the development of evaluated subject gateways will address this reservation over time.

Amongst the electronic enthusiasts there was a belief that the then near future easy access to e-journals, databases and fulltext material would be the norm for a researcher no matter where he or she is geographically located. Authentication problems are still an inhibiting factor in this respect. Researchers

from the science/engineering faculties described the ideal of being able to view and print articles without the complications of IP recognition and a myriad of passwords, most strongly. They agreed that the evolution of desktop delivery any place, any time, anywhere would impact on their research efficiency. Much of this work took place before the Library had acquired many of its electronic journals e.g. the Elsevier Science Direct service has only recently been acquired.

Discipline based differences

As with previous studies, there were strong discipline based differences of opinion regarding the balance of browsing of print versus electronic resources[4]. The electronic collection was more popular with the researchers from Chemical Engineering, Chemistry, Human Movements and Physiology & Pharmacology. Researchers from Studies in Religion, Education and Earth Science placed greater emphasis on the value of the print collection. All favoured easy access to table of contents services. *Web of Science*, which had been acquired by the University of Queensland Library early in 1999, received special mention as a resource valued by researchers in both the arts and the sciences for its unique advantage of citation indexing.

The value of browsing the collection was discussed in detail. There was concern amongst some researchers that the print journal collection should not be whittled away in favour of electronic versions. There was support for the value of "serendipitous" browsing. Individual researchers noted the significance of articles in some of the low impact factor journals in particular. Instances were given where such articles had a major impact on the direction of research projects.

Physical Facilities

The physical separation of latest issues from the rest of the journals was unpopular with some researchers. Some felt that the areas where new journals were displayed in the library were too noisy to be of much use. Researchers favoured the idea of quiet spaces where they could browse, uninterrupted by noise and undergraduate students! Major refurbishment of some UQL branch libraries have been completed over the last few years all driven from the customer focus on the improvement of service delivery[5]. The resulting study areas have been designed to allow for different study styles - quiet areas, less quiet areas, group study facilities. Differing uses of space by different client groups have created competing uses for areas that were originally intended to be quiet study areas, a tension that is not easily resolved. Some strategies have been adopted e.g. use of low hanging lights, to encourage a scholarly ambience in some areas.

Liaison Librarians to help relieve overload

Some researchers expressed interest in having librarians to help them formulate effective search strategies for databases. Others said this would not be appropriate because they were the best-qualified people for the job. While some researchers had adopted strategies to overcome the information overload, some said they did not feel overloaded but had a good grasp of the information in their fields. Strategies adopted by the "overloaded" included removing themselves from all listserves; using table of contents services instead of reading journals; development of critical evaluation skills; judicious use of the delete key when reading emails, and getting assistance from their Liaison Librarians to help design database searches which retrieved the most relevant information.

Service Improvement

Ideas for service improvement were relatively limited, outside of the obvious desire to have more resources, both print and electronic. The need for continued close communication between the Library and the Departments was highlighted. The researchers clearly valued the services provided by the Library and appreciated the opportunity to discuss how services could be best customised and personalised for them.

Postgraduate - Advanced Researcher Differences

The postgraduates raised some different points to those of the leading edge researchers. Both groups expressed satisfaction with current library services, but it became evident that there were greater gaps in the postgraduates' knowledge of services that were available from the Library. The Library conducts a course, Information Skills for Researchers and Postgraduates or ISRAP, which as the name suggests

caters specifically for researchers and postgraduates. The course is run over 3 days, 3 hours each day and includes information on researching at UQL from how to search the catalogue, databases and Internet to how to use Endnote. Those who had attended the ISRAP found it to be very valuable and recommended it highly to others.

Postgraduates suffered more from competing pressures of study, work and family commitments. They wanted to get their information as fast as possible with minimum effort. The Library's provision of reliable database access and the inclusion of Library call numbers and full text was highly valued. The Cybrary website provides access to an alphabetic listing of all electronic journals currently available. All e-journals are listed in the online catalogue with hot links to their websites. Full text to the desktop was the ideal. When material was not available electronically the group was not prepared to pay for the delivery of articles to their departments. A service has since been developed for one Faculty - photocopies of journal articles are hand-delivered to offices, with the Faculty office paying for the service.

Respondents were interested in more personalised services, e.g. one post-graduate liked the idea of having a "personal information/computer consultant" who would know exactly what research requirements he/she had. Such a profile could be kept for all postgraduates, to allow library staff to better target information. Some postgraduates were unaware that a Liaison Librarian was available to assist them.

The postgraduates raised the problem of books' spending "99% of their time on the shelves and then needing to be borrowed by 20 people at the same time!" They thought the arrival of more e-books would alleviate the problems of heavy use and missing items. Items would be available 24 hours per day and could not be hidden or defaced. This of course depends on the license arrangements - some e-book services are being devised on the basis of one user at a time. Humanities representatives were vocal about wanting to browse the shelves. They did not place as heavy an emphasis on electronic resources but they too wanted to see more electronic texts becoming available in the humanities.

Postgraduates said that they did not find email the most useful way to advertise library training sessions. A number admitted to just sending to trash emails regarding library information skills training sessions. There was a greater reliance on word of mouth from colleagues to let them know what was worth attending and what was not.

Future Directions

The work of the CIS Priority Group raised a number of issues, many of which were already known to the Library. It highlighted:

- The lack of awareness of some library services, facilities and collections by both researchers and postgraduates.
- Liaison librarians need to be trained in marketing techniques, developing products targeted to customer needs and promoting them in a more strategic way than we have in the past. Our customer base is not homogenous and any future marketing of library services must accommodate the heterogeneity of a large research university.

In a complex higher education environment the Library seeks to market its services to a broad range of customer groups - academic, postgraduate, undergraduate, university management, general staff and library staff. Marketing strategies need to be organic, elastic and predicated on the idea the information flows two ways between the Library and its customers. The characteristics of our customer base will change, as do the services that are available. The marketing mix needs to be constantly monitored so that product and service information reaches those who need it. The sort of information that was gathered from leading edge researchers during the CIS pilot can form the basis of customer profiles. This is one way that the library can ensure that its services mesh with the research objectives of individuals and the University as a whole.

Good communication between the Library and the faculties is crucial and not just so that we can sell our services. Our customers provide data that informs service delivery and ensures that the Library's

strategic goals complement those of the University. The Liaison Librarian is crucial in this equation and his/her role in delivering and gathering an understanding of customer needs cannot be underestimated. Liaison staff must target services to match their customers needs and continually seek to improve channels of communication - through personal visits, email or structured sessions such as tours and workshops. Marketing expertise has become a core competency for Liaison Librarians, so continuous improvement in the form of new staff development options is essential.

Both researchers and postgraduates were interested in the myCybrary developments. Some of the researchers opted to use the infant service and await future developments with interest. The Library is also exploring how myCybrary can best fit with other projects. Fundamental questions about who can access myCybrary, what form the interface will take and how the service can be evaluated are still under investigation. The University is developing myUQ, a portal that will offer access to a broad range of academic and administrative services and information. This portal will incorporate other customisation projects such as myCybrary and mySInet (Student Information Network), a point where students can enroll each semester, check timetables, enroll for tutorials and check on examination dates. A prototype of myUQ is being developed and it is hoped that it will go live for students late this year[6].

A project such as the one undertaken by the CIS group helps us to better understand our customers' needs and wants. The process of planning and conducting research of this nature is in itself a learning experience. It helped us ascertain that there is demand for customised services and that there is more work to be done in terms of web-based solutions such as myCybrary and ensuring that staff have the right skills to market Library services in a targeted manner.

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IATUL

EDUCATION FOR INFORMATION LITERACY IN CZECH TECHNICAL UNIVERSITIES

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Introduction
Czech technical universities have emerged from the more than forty years of communist domination only a little less effected than other institutions of higher learning. Since they were considered more important for the defense industry than the universities with the humanities and social sciences disciplines, they received better funding. Nevertheless, their libraries and information services remained underfunded and understaffed by western standards. And yet the information support of research and teaching is critical in today's global competition. The situation is only a little better today, mostly thanks to many progressive and hard working library professionals. In addition to the acquisition of needed information sources in both, the traditional as well as the electronic format, they are faced with the education of their users in exploiting these resources and the critical use of the Internet information.

During his sabbatical in the spring semester 2000, the author worked at the Czech Technical University Prague, one of the seven technical universities in the Czech Republic. CTU is one of the oldest technical universities in the world founded in 1717 as the Estates Engineering School. It has passed through several developmental phases until it became the Czech Technical University. In addition to the CTU, the author visited several other major Czech institutions of technical learning, namely the Brno Institute of Technology, the Institute of Chemical Technology in Prague and the Institute of Mining and Metallurgy and Technical University Ostrava.

The main topic of the sabbatical was to assist in the education of engineers in using information resources. The author has had experience from more than thirty years of serving and educating the science and engineering clientele at Arizona Sate University including one year in Saudi Arabia.

Technical Universities Library Organization
Most American universities with engineering programs are served either by separate engineering or science and engineering branch libraries, in some cases the engineering library is housed in the main library.

In the Czech Republic where technical universities exist as separate institutions, the libraries with a few exceptions (IM&M&TU Ostrava) usually reside in the respective college (fakulta) serving a particular discipline, e.g. electrical engineering, mechanical engineering, etc. Even where a "central" library exists there are still these "subject libraries" in individual colleges. Also the concept of the reference librarian/subject specialist is not being employed in the same manner as in the western, especially American library and information service practice. Again, this is the heritage of fourty plus years of neglect under the communist rule and serious underfunding of universities and in particular libraries, both in the material as well as staffing areas. Unfortunately, this situation has not so far improved neither under the democratic governments. And yet the Czechs have to rely predominantly on the brain power to generate research, software designs, and engineering concepts to compete in today's global economy since they don't possess any major sources of raw materials. But there does not seem to be enough willingness among the decision making organs to shift resources and change this situation.

Education in Using Information Resources
Thanks to the understanding of most of the librarians and their supervisors of the importance of using information resources by students and faculty to stay abreast of the current developments, there

gradually started emerging efforts to instruct these users in the utilization of electronic database, most frequently the Compendex and INSPEC.

Czech Technical University
At the CTU it was the Faculty (College) of Mechanical Engineering Library where the instruction in the use of Compendex started first, later followed by courses for different levels of users[1].

At the beginning there were offered lectures for students working on their theses later followed by a course for graduate students (Searching Bibliographic Databases then changed to Scientific Information and their Researching). This was followed by a course titled Sources of Technical Information in Computer Networks. The training in the use of Compendex started originally in 1993, mostly tailored to individual departmental needs. Later it was expanded to include searching other available CD-ROM databases. Finally it has now become a section on Information Resources within the mandatory "Computer Network Services" course.

This education in the use of information resources encompasses the library/information terminology, primary, secondary and tertiary sources of information, library catalogs, specialised databases, search strategies, importance of patent information, technical standards, citation indexes, copyright, document delivery, sources and tools of the Internet and then practical exercises on a given topic.

Institute of Chemical Technology Prague
The ICT has one of the best collections of chemical literature for their faculty and students in the Czech Republic. It also provides access to the major electronic tools like Chemical Abstracts, Crossfire Beilstein, Food Science & Technology Abstracts, Current Contents and several other sources. The instruction in the use of chemical literature runs on two levels. [2] [3] On the first level, most faculties (colleges) offer introductory courses for students in 14 sessions ranging from collection and dissemination, searching and exploitation of information, secondary information to ChemAbstracts in electronic format, Beilstein, FSTA, exploring the Internet, patent information and including seminars with a tour of the library and practical exercises. As recommended literature, Dr J Silhanek, who leads these courses, prepared several publication incl. Introduction to Chemical Information, Chemical Abstracts on CD-ROM and Guide to Crossfire Plus Reaction Database System. On the second, advanced level, the library offers specialised information courses aimed at faculty and doctoral students of training in the use of Chemical Abstracts, Crossfire Beilstein, FSTA, etc.

Technical University Brno
The TU Brno has embarked on the decision to educate users in information technologies in the early nineties. The university administration has approved the introduction of a mandatory course for all first year students [4]. It is a four hour course, two hours are devoted to the introductory computing, the other two hours are dealing with the use of computers in library/information applications. The Computing Center staff teaches the first part, the Central Library librarians the second part. They teach students from all faculties (colleges) except the Civil Engineering College which is responsible for this course at their own library.

The library lectures are supplemented by a video so that the student can see a visual demo of accessing a database. Later in a practical portion the students search available databases under the librarian's supervision. The proportion of the theoretical part to the practical one is two to one. In the theoretical lectures the students are acquainted with the library/information terminology, basic concepts of search strategies and access to online library catalogs. The exercises in searching various databases are geared to the particular college subject area.

The Institute of Mining & Metallurgy & Technical University Ostrava
The situation concerning the education of library users is effected by serious understaffing by professional librarians. The cental library is only a little over ten years old and does not seem to have space shortage, rather a complicated layout and lack of proper furnishings. Because of the librarians shortage the library reacts to the requests by professors and conducts orientations and lectures geared to specific classes. There is only one formal course taught by the director of the library in the Mining &

Geological Faculty (college) called Informatics and Bibliography. The library attempts to reach the rest of potential library users and improve their education by designing a very informative library web page [5].

Present Situation and Future Plans

In her annual report Dr Barbara Ramajzlova, Director of Libraries at the CTU, describes the problems with the education of users [6]. CTU has access to the Dialog Premier Gold Plan which makes available hundreds of databases in all subject areas but the most important for CTU users are Compendex, INSPEC and several related databases. It is here where the education of engineers in exploitation of information resources comes into play.

Under Dr Ramajzlova's leadership several grant proposals have been submitted. One, "The Concept of Information Education" was a par of a larger proposal "Contribution to the Development of Distance and Lifelong Education at CTU". The project co-directors have been Dr Ludmila Ticha and Mgr Stepanka Zizkova, both of whom have been very active in the classroom instruction of users, in particular teaching the use of Compendex.

The new proposal by the same authors is called "Information Preparation of CTU Users" [7]. The goal of this grant proposal is a work on the system of the information preparation of users, mostly students, according to the stages of information literacy. The authors realize that most students entering CTU lack the elementary knowledge needed to exploit information sources, i.e. they lack the basic stage of preparation as users which includes information about libraries, online catalogs, document description and types of documents (primary, secondary, etc). This information will be available on the library web pages and will include basic library/information terminology. The medium stage of information literacy represents knowledge and skills that the student should possess to effectively use the information sources.

The proposed solution will exploit the possibilities of modern information and communication technologies, advise users how to access tests containing the terminology, descriptions of and recommendations how to use individual information systems, sources and services as well as the instructional programs for end user searching. The project will be useful for universities and supports clearly the tenets of the state information policy in education.

New "National Technical Library"

Along with these endeavors, the present State Technical Library which had its roots in the central library of technical universities but acquired a separate status in the fifties, has embarked on a program of building a new "National Technical Library" which will also serve the needs of both, the Czech Technical University and the Institute of Chemical Technology [8]. The new library, if built as planned, will be built in the middle of the CTU/ICT campus in Dejvice. This is a very ambitious project, a library of approximately 26,800 sq m (almost 300,000 sq ft), holding about 1,100,000 volumes. The library will have 2,000 readers' stations with 1,000 PC work stations. The total number of employees will be 244. The library will combine the collections of the State Technical Library as well as the collections of the CTU & ICT libraries and also their staffs. In this respect, this library will follow the pattern used by some West European universities e.g. Technische Universitaet & Informstionsbibliothek Hannover, ETH Zurich or the Delft Technical University. These libraries serve both, their university clientele as well as the central technical libraries of their respective countries.

With the construction of this library, the students, faculty as well as the technical public will enjoy the information services they all deserve.

Conclusions

The opportunity for access to electronic databases has considerably improved in the last several years, e.g. in June Czech researchers will also have access to the Web of Science by ISI. And there are serious efforts to further improve the education of engineers in Czech Technical Universities, to increase their information literacy which will enable them to be on the cutting edge of technologies, lead by the few dedicated professional librarians. Unfortunately, the biggest obstacle is the shortage of professional staff

and to a certain extent also the absence of a modern library with classrooms for instruction in the use of electronic resources. This, hopefully, should be remedied by the construction of the new National Technical Library with adequate professional staffing.

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IATUL

INFORMATION LITERACY FOR THE SKEPTICAL LIBRARY DIRECTOR

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In the United States in the 1980s, there was a major educational reform effort that focused on both K-12 and higher education. During those years it seemed that every organization that had anything to do with education, and a lot that had nothing to do with education, wrote a report on how the educational system in America was not working and recommended how things should change. One of the things that was really remarkable about these reports which tapered off at the end of the 80's (so we're talking only 20 years ago) was that only two of them mentioned libraries. Not only did they not mention libraries, they didn't mention information technology. They didn't even mention the Information Age, even though Alvin Toffler [1] years before had sent out the alert that we were in the Information Age. So it was remarkable that so many brilliant people, or at least people who thought they were brilliant, could be suggesting how to reform education while ignoring the world in which current and all future generations were going to live and work.

So in a spirit of frustration and concern Bob Wedgeworth, who was at one time Executive Director of the American Library Association and at that time Dean of the library school at Columbia, and I got together. I had called him and said, "We need to change higher education; and, if you want to be part of doing that, let's meet for breakfast before you fly back to New York City." I remember that he laughed and said "Well, you're not going to tell me anything more about this are you?" and I replied "No, not until we meet." We got together the next morning and came up with an idea. It was for a one time collaboration between the University of Colorado, where I was working, and Columbia University. With support form the CU President and others at Columbia, we organized a higher education summit. We also invited not only librarians, but the highest, most prestigious people from higher education including Ernie Boyer, whom some of you may know. His book, College: the Undergraduate Experience in America [2] came out very late in the reform effort and was the only one which envisioned a role for libraries in the improvement of learning. In it he said it was important for students to spend as much time in the library as they did in the classroom learning how to use the whole range of information resources. We invited this esteemed higher education leader, and he came! And others did too. Going into the conference, we didn't know what would happen. Would they just laugh at us? That was a possibility, but we also knew that nothing would change if we did not take the risk. Then we locked them away in old New York Governor Harriman's estate on the Hudson River, and for three days we talked about the role of libraries in quality education.

Out of the conference came a book [3], but more importantly out of it came the beginning of the information literacy movement, as we know it today. One of the people at that conference was Margaret Chisholm, the incoming president of the American Library Association, and she called me and said, "This is too important to stop here. And it's got to be expanded to include K-12. Do you think we can get together a prestigious enough group of educational leaders to come together with librarians to continue this dialogue?" And that's what we did. We recruited to the effort people like the Executive Director of the American Association of School Administrators and the Executive Director of the American Association of Colleges of Teacher Education. Seven education leaders came together with six librarians and produced in 1989 the ALA Presidential Committee on Information Literacy Final Report [4] which was released in Washington, DC, as part of the ALA Midwinter meeting at a press conference.

One of the recommendations that came out of the report was the formation of an ongoing collaboration on information literacy, and I will now confess something that very few people know. The organizations

that were involved with the original committee came together with a couple of other people who were at the press conference and who immediately bought into the importance of people becoming effective information consumers, and we said "OK, what other organizations should we ask to join this collaboration?" We came up with a list and they said (because I chaired the original committee), "Patricia, you go and write all these organizations and tell them to come to a meeting and so we can get started." I had one moment of sheer panic. What if I wrote to all these non-library organizations and invited them to come and nobody came? How embarrassing it would be in front of these people who had been part of the effort. Well, my fears were unfounded. People came.

I tell this story about my fears, because it really sets the context for what I want to say to you today. What we are about in promoting information literacy is really important in terms of people's lives; if we keep information literacy as a library issue, if we fear being rejected, if we fear losing control by partnering with educators and others, we are never going to get anywhere. This is not a library issue. This is an educational issue. This is an economic development issue. This is a health issue. This is a matter of life and death for a lot of people. And we have something to offer that the rest of the world doesn't know about because we are the experts in information management. We are the experts in helping people connect with information they need. But what I see in my own country is a reluctance to let go. We like to stand up in front of a group of students and give lectures. Now we know that lecturing doesn't work. That's not how people learn. But we want to lecture anyway, and we don't really don't really trust those professors or those teachers to do it because they don't really understand it the way we do. As a result we are not making nearly as much progress as we hope for. I want all of you to take a piece of paper and pencil, and I want you to write down how many library conferences you went to last year, and the approximate number of days you spent at these conferences or in work to prepare for obligations you had at the conferences. I did it myself yesterday, because I thought what a wonderful group IATUL is, and maybe I should add this group to my list of library meetings that I regularly attend. And I started writing down the national, state and university meetings that I really need to attend as part of my responsibilities as Dean of San Jose State University Library plus some other musts like the National Forum on Information Literacy. You know what I came up with? Averaging only 3 days a conference (which is really underestimating because of adds like the kangaroo petting and the other nice things that we did at this conference) I came up with a month. A whole solid month! And that was without counting preparation time. Now assuming that we all have libraries that we need to operate and assuming that we are going to take some vacation and not lose track of our families (all of which are very important), when do we have time to talk to non-librarians? When do we have time to suggest to them that we have an answer to some of the problems and issues with which they are struggling? For example, part of economic development is an information problem, and economic development comes from small businesses. Where do small businesses get their information from? There was some research done in the United States that found that small business people when they want advice go to a personal friend. Not necessarily a lawyer, or a banker, or anybody who really knows anything about anything, but somebody they just trust on a personal level. Now if you happen to be well educated and have a wide group of professional colleagues you might do all right in that process, but most small business people don't. Their friends don't know more than they do; and then we wonder why so many small businesses fail. Don't you have something to offer to help your community or your country, promote the success of small businesses? I think you do.

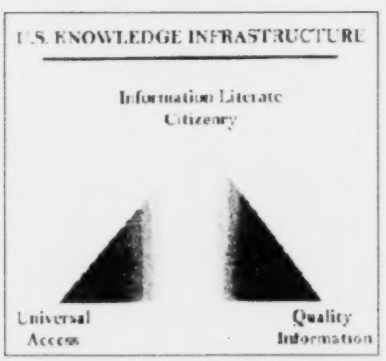
How about health? All you have to do is really get sick or have somebody get sick in your family and you want to know everything there is on that illness, and you really want local information because that's where you are going to get your help. When I was in Michigan there was a conference of regional government people. One of the men in his speech said there were over 40,000 web sites that had medical information, and the gentlemen commented that he wondered how many people had died from information they had received over the web. I have here an article from Good Housekeeping (It's one of those magazines that tells you how to cook delicious meals and then tells you how to diet to take the weight off.) The article is entitled, "Warning! The Internet could be Hazardous to Your Health." [5] Don't we have something to offer people to better manage information to meet their health needs? Of course, we do.

Let me suggest to you that given this rising awareness of problems related to too much information, we have a unique window of opportunity to significantly move our communities, our states, and our

countries forward in dealing with 21st Century information management. People are starting to question. "Hey, wait a minute. Sure there is a lot of information out there, but is that enough? What about the quality of it? What about the people who don't have access to it? I don't know about in your countries, but the phrase "the Digital Divide" is making our newspapers a lot these days. It's a hot topic. With all the developments in information technology and Internet use, there is only a small group of people that are getting richer and richer. In fact, in Silicon Valley we have a major problem with custodians, the people who cook the fast food and secretaries. They can't afford to live in Silicon Valley any more. There was an article in my paper a few months ago documenting the same problem in Japan. We have a few people getting richer and richer. The poor are not getting poorer, but they are not getting richer so the gap is getting bigger and bigger.

One must give the Clinton/Gore administration a lot of credit, because they put information technology on our national radar screen, and they have really pushed to get Internet access for everybody. But it's not lessening that gap between the have and have-nots. It's just as wide as it was. There are two other things besides access that are necessary for closing that digital divide. The information that people need must be available and it must be quality information or the access is of little or no value. Of course, we have a bit of a problem considering quality control regarding information in the United States, because freedom of speech is really important to us. Besides, how would you control the Internet for quality if you wanted to? But even adequate information and Internet access cannot close that gap in the digital divide.

Only if we also have people who can navigate through that overwhelming amount of information including the information junk that is out there to find the information they need; only if they are smart enough to know when they should not go to the Internet but a book or a government agency or some other community source then we can bridge the gap. To move information have-nots to being information haves all three elements must be present: access, quality information and information savvy people. Indeed, any sound information policy must contain those three components.



Information Literacy Triangle

In America we are already doing very well with universal access by getting Internet into all schools and public libraries, but we don't really know how much good the access is accomplishing. One of the last things I did at Wayne State University was help one of our faculty members get a grant to study African Americans in five major cities who have gained access to Internet through public libraries to see was it making a difference to the quality of their lives. We don't know whether it is making a difference or not. If all they are doing is sending email to friends and relatives, the chances are that there is little impact on their quality of life. We need more research in that area. In the United States we are moving toward universal access; and now the intent is to try to get the Internet into every home. But I would argue that Internet access is simply not enough. Access is not going to help people who cannot find helpful information on the Internet or if they can't find information because it's just not there (which is usually the local and regional information that is not commercially viable for somebody to package that and put it up on online). Moreover, far too often the problem is far too much information being available which puts a lot of burden on people to find their way through it, and how can they navigate through that tidal

wave without adequate training?

What would happen if every research dollar the U.S. puts into technology research would include a requirement for a small percentage of the funds to be set aside to educate people to take advantage of the resulting technological advancements? I believe we would see a much better return on our research dollars in areas in which technology has had disappointing results to date. For example, has technology really improved education in your country? It has not in America. Why? Because teachers don't have the materials to integrate into the curriculum and don't know how to do it. We're spending lots of money to train teachers how to use technology but not on software development or on how to facilitate teachers' integrating technology resources into their lessons. Nor do we have school library specialists in a lot of our schools to help bridge this gap. So our great investment in technology is paying off poorly in education, and more and more people are being disillusioned by the lack of progress.

Now what is information literacy? Nancy mentioned a lot of terms: user education, bibliographic instruction. I asked a bunch of college students one time what they thought bibliographic instruction was, and they said it has something to do with bibliographies. So why we ever used that term I don't know. But when we discuss information literacy, we are not talking about library instruction. We are not talking about bibliographic instruction. Library and bibliographic instruction are primarily watered down reference courses where librarians point to good print and online resources that can be helpful for a particular course or assignment. On the other hand, Information Literacy is an outcome. It is a student learning outcome. It doesn't have to do with the input, it has to do with what people can do after they have the input. Do they know when they have an information need? (That is the hardest thing of all. People know they have a problem, but frequently they don't know that they have an information need to address that problem.) Can they identify the kind of information that can help them solve that problem or issue at hand? Once they figure out the kind of information help, then can they locate it? Next and of greatest importance can they evaluate that information effectively? This is actually the heart of the written definition in the 1989 ALA Presidential Committee on Information Literacy Final Report. What has happened since that report was written is the Internet; so, although evaluation of information has always been important, given that tidal wave of information that is overwhelming people, evaluative skills are even more critical today than in 1989. Finally can you organize the information you have chosen and can you use it effectively for whatever need you have. If you can do those things, you are information literate and you are prepared for lifelong learning. There is, in fact, in many countries a growing concern for a lifelong learning workforce, and this is another opportunity for promoting information literacy.

Thanks to Alan Bundy I found a report which probably a lot more of you are familiar with than I. It is an UNESCO report of the International Commission of Education for the 21st Century.[6] The chair of that commission is Jacques Delors. The report talks about some of those lists we had earlier in this conference regarding the tensions that exist and are pulling us apart. The tensions between the global and the local. The tension between the universal and the individual. The tension between tradition and modernity. The tension between long term and short term considerations. The tensions between the need for competition and the concern for equality of opportunity. Delors says in the introduction, "This has led us to rethink and update the concept of lifelong education so to reconcile three forces, competition which provides incentives, cooperation which gives strength and solidarity which unites." [7] The recommendations of the report include that lifelong learning goes beyond continuing education at a university: "It should open up opportunities for learning for all, for many different purposes-offering them a second or a third chance, satisfying their desire for knowledge and beauty or their desire to surpass themselves, or making it possible to broaden and deepen strictly vocational forms of training, including practical training. In short, 'learning throughout life' must take advantage of all the opportunities offered by society." [8] But taking advantage of all the opportunities offered by society will depend upon a peoples' ability to know they have a need for information, to be able to identify, locate, evaluate, organize and effectively use information. That is one of the reasons why when a country decides to get serious about lifelong learning, information literacy becomes a very natural partner because lifelong learning in an Information Age can't happen without a population, without a citizenry, that is information literate.

Now it may be that your policy leaders may need a little nudge to make the connection between a lifelong learning workforce and information literacy, but it is such an obvious one. I have been in many conversations discussing issues like the Digital Divide, and just like the cartoons where you see the light bulb go off overhead; I see it happening. It's so obvious once they think about it--which is why we can't spend all that time at library meetings. We need to be turning on the bulbs of policy makers and the keepers of the purse strings. Perhaps you can do this with those you work with directly, but you can do it with others as well and sometimes more easily. For example, academic librarians can do a lot to foster the promotion of information literacy at the school level, because you don't appear self serving. We need to encourage our campuses to articulate to high schools information literacy as one of the abilities expected of students coming to our campuses. We are not shy in saying that students must have four years of math or other requirements, and we can influence our campuses to let schools know they can help students be successful, both as academicians and in their life, they by developing information literacy skills. Moreover, there are expectations that students will have some fundamentals mastered before they get to you. (Wouldn't it be wonderful not to have to start every information literacy at the college level at the very least common denominator?) When you start these campus conversations, you need to place information literacy within the context of the things that our campuses and schools are already concerned about and are talking about. You need to position information literacy as part of the larger set of critical thinking skills.

Information Literacy Umbrella

Remember when our campuses started emphasizing computer literacy? Well it just is not enough. There is library literacy, media literacy, network literacy and visual literacy. Even before that, we have to be concerned about basic reading skills. There are two national literacy organizations in the National Forum on Information Literacy because being able to read without being able to find the information needed to read only has you half way there. So we have to start with the basic literacy, and then information literacy brings all the other literacies together as a major component in the critical thinking skills. It's the old Liberal Arts concept: people have to be prepared for lifelong learning to be successful in the world.

I don't know how many of you are familiar with the Global Knowledge Partnership, which is a very interesting group made up of a number of UNESCO units, the World Bank, some countries, the Canadian Broadcasting Company, etc. It is a very eclectic group (even more eclectic than our National Forum on Information Literacy) which has stated that not just access, but "effective use of knowledge and information" [9] are increasingly important factors in sustainable economic and social development for individual communities and nations. Their concern focuses not only on the problems of the haves and the have-nots among individuals but also among countries. This group is evidence that more and more people are starting to ask the right kinds of questions, and this provides some windows of opportunity to nudge people into realizing the importance of information literacy.

Key to this "nudging" is to start with other people's agendas. If we start by promoting information literacy or even libraries, we are just one other self serving group of people out there selling something, but what we really have are solutions to offer as policy makers grapple with major concerns. So, for example, I was brainstorming with somebody yesterday about how you in Australia could determine

what the particular issues and key interests were of your legislators. Who really cares, for example, about the plight of the "at risk" people? Whether that's your native population or just children who aren't in homes and communities where they have had much going for them. Who is really championing for those people? Talk to them about what information literacy can offer to address this challenge. Look for ways to bring to the table on a regular basis not just librarians but people from other groups who share some concerns about people empowerment. This is what the Forum has done. I think it is still unique. We have over 75 members, and I'm delighted to say that both Nancy and Michael have indicated to me that IATUL wishes to become a member. I think it will be good for your organization, too; because we maintain a web page (Infolit.org if you want to view it) and on it we keep a profile of all of our member organizations. To people who may not know IATUL, it will give visibility, and it will also give you an opportunity on a regular basis to share through the Forum some of your information literacy accomplishments.

The approach we have taken with the Forum is that we do not set up an agenda and get everybody to work towards it. Rather we work to support them as they seek to promote information literacy in ways that are meaningful for their memberships. That is what they are there for--to serve their membership, not the Forum, not librarianship. This approach has worked exceedingly well. It has frequently meant, for example, members from one organization speaking at another's annual conference. For example, I've been asked to speak at the November conference of the National Council of Teachers of English. Or for their publications, somebody from one organization will work with another to get articles into print. Some of the organizations have prepared policy statements for adoption by their memberships regarding information literacy. But in every case the action is empowering the organizations to do what they need to do for their membership. For example, when the Association of College & Research Libraries came out with its standards for information literacy [10], the American Association for Higher Education endorsed it. (AAHE is a member of the Forum.) AAHE also asked me to do an article calling attention to the fact that this is only the second time in the history of the organization it has endorsed standards and to tie information literacy into its current focus on "the engaged campus." So the Forum's main focus is on looking for those windows of opportunities where what a particular organization is doing has a match with what information literacy can support and being willing to step in and do whatever is needed.

However, occasionally we do come together to do some things jointly. An issue of particular concern to the Forum is teacher education. If teachers don't know anything about their libraries, if they're not information literate, what are the chances they are going to construct curriculums that include information literacy? So when the accrediting council for colleges of teacher education was revising their standards, this was a key issue for us. So the Forum as a whole agreed we needed to try to make sure that information literacy got in this document, and a group of our members that were particularly involved with teacher education lead the effort. We fed in comments at several points in the review process, and I am happy to report we got information literacy incorporated into the national standards.

Another thing is that the Forum is undertaking as a group effort (and may be of particular interest to IATUL) is the holding of an international invitational congress on information literacy. (The Forum, incidentally, has no dues, no officers, and no official status, which is one of the reasons our meetings are so exciting. We never get bogged down in running the organization!) For this effort we are going to need to use some of our members to help position us to partner with UNESCO and other key players. The issues to be explored include: What aspects of information literacy are unique to a country? What apply across all countries? What can we learn from conversations together? What can we learn by pulling in leadership people from different countries regarding research?

Please note: we are not talking about bringing together librarians. They alone cannot make a difference. We're talking about organizing an event that would bring together leadership teams from countries. So to come and participate, you would need to include a policy maker from your Ministry of Education, somebody who has leadership responsibility in your country's economic development, and whatever other agencies determined by the planning committee. Teams such as these can go a long way to ensuring that something will really happen when people go back to their countries. So I'm hoping that many of you will be interested in trying to assemble teams to participate in that congress; and our hope would be that, if we pull off the congress all right, then the following year we could have an open

conference and everyone who is interested could come with or without teams.

OK, I did promise some practical advice. So I'm going to back off the national and international scenes to address campus issues. We have had a lot of opportunity at this conference to hear the challenges that surround us and they are almost overwhelming. The truth of the matter is that we're not getting more money. We're going to be expected to do everything we ever did and a lot of other things on top of it. (We're also expecting our library schools, without expanding curriculum, to teach everything that we learned in school plus all the new stuff, and that's not working very well either.) And I don't know how unless one is at a really, really big major research institution, (e.g. in Wayne State University where I had a University Press reporting to me) that a librarian can really make a significant difference in terms of packaging information. I know digitization is important, but most of us are in situations without the resources that allow us to move far in that direction.

So I'd like to argue (I'll let the research library directors attack me later.) for not worrying quite so much about digitizing to devote our time and energy to trying to improve people's lives. This can only happen when we change the learning process; when we help our campuses move from a teaching mode of open-head-and-pour-in-information. There is an ASHE/ERIC publication that has pulled together all the research on lecturing, and it's pretty scary in terms of what students don't remember, how quickly. (Which always makes me nervous when I make a speech like this, because you're not going to be tested next week and so you are going to remember even less than that 10% or 14% which is the norm.)

On most of our campuses now, at least in my country, there is a lot of pressure to switch from a focus on teaching to a focus on student learning outcomes. Instead of saying "We're a great institution because we have x number of professors with PhDs and our students come to us with grade point averages of y;" now it's "Our students can do … when they graduate." Today there are too many business people and too many legislators who are tired of college graduates who can't write a decent report, who can't problem solve, who can't work together in teams; and so we have a very strong emphasis on assessing student learning outcomes. That's why things like the ACRL standards are really important, because it's giving tools to librarians to be able to respond to the need for assessment.

But how can students become information literate? It can only happen when students' learning experiences go beyond their being passive recipients of information who can regurgitate information for a test before they really forget it, but to students who are consistently across the curriculum given opportunities to practice finding and evaluating information for an issue or problem at hand. We're really taking about a more active undergraduate learning experience, and a lot of educators are concerned about it. They may call it problem based learning, they may call it resource based learning or in the medical field, they may call it informatics. It doesn't matter what they call it. They are concerned that students leave the campuses prepared to solve problems and move ahead in their careers, and we should be aligning ourselves on our campuses with the people who are concerned about those issues. If need be, let's not call it information literacy but rather use their vocabulary.

And directors, and this time I will speak to directors, to do that is going to take a lot more than just your reference librarians or your liaison librarians going out and making friends with faculty members who are sympathetic. That kind of shotgun approach here and there isn't going to accomplish any kind of consistency in guaranteeing students their basic rights to learn these skills while students on your campuses. You need to be involved in ensuring across the general education curriculum students' learning basic information literacy abilities. When they get into the majors, information literacy must be there tailored to what they are going to have to do when they are out in the real world. This isn't going to happen without the director's active involvement. Now I realize that there are very few campuses where the other deans are asking the deans or directors of the libraries to play a leadership role in reforming learning and moving from teaching to learning. But oh my! don't you have a lot to offer to those issues?! You need to be out there working at the policy level; because, unless you are, your librarians can never be a significant partner in the process. Nor is having an information literacy position on your staff enough. You have to be out playing a leadership role on your campus.

OK, now for the practical steps. This is mainly for directors, but those of you who aren't directors listen and go tell your director this is what they should be doing. First, directors, take time to think through this

concept for yourself. See if you really understand it. Whether you really think it's important. You only have so many political chips to use on campus; and, if you are going to use them for information literacy, you have to know that the issue is important to be willing not to do something else. Don't say you haven't the resources to move ahead. Which of us got a lot more resources when electronic journals came along? Anybody? We didn't. But we bought them anyway, because we knew we had to, because we knew they were important, because we knew there were some good tradeoffs in doing so. It is the same thing with information literacy. Unless your commitment is real, which means that you realign some resources within your library to do it, nobody is going to take you seriously.

Second, ask questions on campus; don't start in a vacuum. Find out what's going on. Find the best that is going on with information literacy on your campus but also find who are your potential colleagues. Is retention a major issue on your campus right now? Then make sure you have some contact with the retention committee helping them to figure how information literacy can help students stay in school. If the campus concern is attracting new students, be in there talking about how guaranteeing that students will graduate information literate will help attract students to your campus. You need to be out asking questions. You need to be talking with other deans saying "Well, what are the skills that graduates from your program need to have for the workforce today?" And keep asking the questions until they come around to critical thinking and problem solving. That lays the groundwork for your suggesting librarians coming in and actually designing curriculum with the faculty. Again don't be concerned about the vocabulary. Whether people are concerned with undergraduate research or problem based learning, talk so they can realize that you are talking about the same thing that they are.

Third, find out what are the barriers. For example, is there some barrier to retention, promotion and tenure criteria in promoting information literacy? Look at the infrastructure on your campus and see what needs to be changed. Obviously all this background work should, as step four, result in a plan. You can't do everything at once so you need to figure where you are going to get this best bang for your buck, and then make sure from the very beginning that you build in assessment. Seek to document that students are writing better papers and doing better reports because of the information literacy opportunities that they've had. In surveys of alumni make sure there are questions regarding how they use these skills in the workplace. This kind of documentation can ensure open doors in the future.

Finally, celebrate successes! Because you are going to have them. And one of the best things you can do is highlight the best of what the classroom faculty and librarians are already doing on your campus. Hearing from a peer about the pay-off from incorporating information literacy into the curriculum is the best way to inspire others. When faculty talk about the better papers and reports their students are doing, other faculty listen. Remember, we are not selling information literacy we are selling student success.

Now I want to tell you why I'm passionate on the topic of information literacy. I have three grandchildren. How many of you have a child that's very important to you: a child, a grandchild, a niece, a nephew? Raise your hands. Well for those of you who don't, I'm sorry, but for the rest of you: what do you want for the child you love? You want a good future, right? Now the fact that you're here today it bodes very well that the children you're concerned about are going to have good futures. They are going to be encouraged to go on and develop their skills and abilities. But that's not true for a lot of children. And if we cannot close that information gap, if the numbers of the have-nots keeps growing, the have-nots will weigh down our economies and our communities, so that the future of the children so dear to you will not be the best you would hope for them. And so that's why we have to be concerned about promoting information literacy. That's why it has to be a matter of passion. That's why I put information literacy far before digitizing collections. Because we are talking about the lives of real children. Because, if we can't get through to them, if we can't move the have-nots into becoming information haves, not only are they and their families and their futures going to be blighted, but it will also negatively impact on those who are nearest and dearest to us.

I also truly believe (some of you know that my Christian faith means a great deal to me) that we are promised that when we do unto the "least of these" [11] that our efforts will be blessed and will prosper. I consider information literacy a very real way of ministering unto the least of these, and so it carries with it the promise of blessings for those we serve and for us.

So please be passionate. Please, I would urge you, make a commitment before you leave here to do one thing you wouldn't have done if you hadn't heard me speak today. Speak to a policy maker you know socially or somebody on your campus. Talk to them and help that light bulb go off; because, if you don't do that, nothing is going to happen. Whether you are a library director or not, be a part of this really exciting call to make a difference for the better in our world.

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11. Matthew 25:40

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IATUL

Knowledge management in the current research environment

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ABSTRACT

Effective knowledge management in the research process has never been more demanding. The pace of innovation and the need for speedy solutions to practical problems set significant challenges. The rapid growth of knowledge, the emergence of interdisciplinary approaches and increasing numbers of researchers create issues in information access. Developments in the information and telecommunications technologies have created virtual communities of researchers in every discipline, transcending campus and national boundaries. How is effective research conducted today? What problems are being investigated? What information is required and how is it best acquired during the research endeavour? What are the most effective ways of linking researchers to the information they need? The paper will address the challenges and opportunities facing today's researchers in their quest for knowledge and solutions to problems. It will be illustrated by case histories of two major international projects in which the author has been involved recently.

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IATUL

FORWARD WITH IMAGINATION: INNOVATIVE LIBRARY CLIENT SERVICES FOR THE 21ST CENTURY

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Fostering and facilitating innovation, the intelligent use of knowledge and an internal enterprise culture which embraces change are critical issues for universities and their libraries. In considering innovation in academic libraries, this paper has three parts. The first explores the definition and nature of innovation and the literature relevant to academic libraries in particular. In the second part the outcomes of a search of library websites and a survey of IATUL and Australasian academic libraries are detailed. The final part reviews the issues which need to be considered by libraries seeking to be innovative and learning organizations in the 21st century.

Innovation: what is it?

The English word *innovation* derives from the Latin innovare which means to renew or alter. According the Oxford English Dictionary (OED) the senses of the 'introduction of novelties' and of 'something new introduced' may be traced as far back as the sixteenth century.

Another meaning for innovation is proposed in the OED. This has a commercial sense and is 'the action of introducing a new product into the market; a product newly brought onto the market'. Such usage is over 50 years old, and is the dominant popular understanding today.

As the managing director of the Australian company Cochlear Ltd, the pioneer of the bionic ear, stated in a lecture in April of this year, in a business context

> Innovation is not just the idea. Innovation is achieved only when the idea has been transferred into an outcome which has value to the extent that people are prepared to pay for it.

In his 1997 book *Implementation of organizational innovation: studies of academic and research libraries* Australian library educator Peter Clayton points out that there are other definitions, with a more academic flavour, to be considered.

One is 'any idea, practice or material artefact perceived to be new by the relevant unit of adoption'.

Similarly, in their 1994 book *Information services for innovative organizations*, Maguire, Kazlauskas and Weir define innovation as

> ...the application in any organization of ideas new to it, whether they are embodied in products, processes, services, or in the systems of management and marketing through which the organization operates.

As Clayton comments, this kind of definition implies that

> . . . anything that is being done for the first time in your organization is an innovation for you. Put it that way and every organization has to innovate much of the time . . . any organization that is not regularly doing things that it has not done before will become increasingly out of touch and irrelevant. So the implementation of innovation is not just important, it is a critical issue for organizations of all kinds.

The Literature

The copious innovation literature of the last three decades is not replete with books, or even journal articles, specific to libraries. Clayton's book, which does contain an extensive bibliography on innovation, is one laudable exception. It is complemented by his articles on organizational learning and the 'learning library'. His book is instructive, because it draws heavily on a series of case studies in academic and research libraries carried out over several years. It also assumes that libraries have much in common with other organizations in the adoption and implementation of innovation. This assumption was validated by Clayton's case study research.

The other text which is worthy of greater attention than it has possibly received is that of Maguire, Kazlauskas and Weir. Maguire, also an Australian library educator, and her colleagues have produced a book which is well endowed with quotations and bibliographic references to the importance of national and company competitiveness and the management of innovation. It explores the meaning of innovation and its importance in modern societies. The models of the innovation process used in the book all establish information flow, broadly defined, as a key component of the innovation process.

At a more pragmatic level is a recent UK Library Association publication *Becoming a successful entrepreneur: a practical guide to creating an innovative information service*. The preface to its fifth chapter, 'Delivering innovative services', observes that

> It would be easy to devote this entire book to the ways in which new technology and libraries have come together. It is one of the paradoxes of the profession that a group of people perceived as being so traditional have been such enthusiasts for new technology.

There are some, such as Walt Crawford and Michael Gorman, who contend that the library profession has become too enthusiastic about the technology, and lost balance and perspective about its societal role and responsibility for the record of human endeavour. There are others outside the library profession, such as Clifford Stoll, Jamie McKenzie and the Technorealism movement who present a convincing case for education and society at large manifesting the same loss, and of succumbing to 'the Age of Glib' and rampant technohucksterism.

Nonetheless, chapter five of *Becoming a successful entrepreneur* provides a range of UK and international examples of, often technologically driven, library innovation. These are mostly taken from public and academic libraries. It is argued that none of them 'would happen without the entrepreneurial information professional...who looks for the opportunities to develop new value from existing resources, or new resources to develop further value'.

The survey

To extend the range of examples of innovation given in *Becoming a successful entrepreneur*, a one page survey of all IATUL members, of all Australian and New Zealand University and technical and further education (Tafe) libraries was undertaken early in 2000.

A wide ranging search of websites of English language university libraries was also undertaken to identify examples of mission statements emphasising innovation, and examples of innovations themselves.

The results of such a simple survey are indicative only, and necessarily limited in terms of data. However they do convey an impression of where a fairly large number and range of academic libraries stand in relation to innovation in client services in this last year of the 20th century.

IATUL MEMBER RESPONSES (excludes Australia and New Zealand)
Forty nine responses were received

Physical innovations since 1995
Annual report (several were sent with the survey responses - the most innovative is that of the University of Waterloo, Canada)
Campus wide delivery of books
Coffee shops (9)
Color copying (3)
Computer information retrieval laboratory (4)
Consolidation of service points (5)
Digital cameras for hire
Drive by issue and return (2)
Electronic scanning system (5)
Fee based reservation service
Integrated library, university press, copy shop, multimedia team
Internet access via laptops (2)
Internet reading room (browsing, email, text editing)
IT Intensive Knowledge Commons
Longer hours (9)
More open access (5)
Music listening booths
Pickup of phone ordered books
Second hand IT/PC sale
Self check loans (20)
Self service bar
Seven days a week opening (4)
TV sets for hire
Twenty four hour opening (2)
Twenty four hour PC labs (5)
Twenty four hours self issue and return
Wireless access by mobile users
Wireless broadband information retrieval
Wireless internet access
www user registration

Electronic and nonelectronic information service innovations since 1995
Aerospace and Defence Internet gateway
ARIEL document delivery (5)
Digital library projects (2)
Digital Media Archive
Electronic full text journals (19)
Electronic reference service (9)
Email and www document delivery (6)
End user online searching via STN and DIALOG
Infokiosk (3)
Online self renewals/reservations (8)
Opac requests from closed stack (2)
Portfolio databases for scientific expertise
Protected user accounts
Scanner/printer for braille materials
Web virtual libraries (4)
Webopac (8)

Information literacy innovations since 1995
Courses in e-publishing
Integrated project on curriculum and information education for civil engineering

Literature review as research method
National TV program 'University library on the information highway'
New training sessions 'Finding quality information on the internet'
Software module for postgraduate researchers
Speed reading workshop
Team teaching (4)
Team teaching between university and library school staff
Use of EU program DEDICATE (2)
User education sessions (8)
Web pathfinders/database guides (8)

Community access innovations since 1995
Borrowing by high school students (3)
Consultancy services (5)
Five per cent of use by people not members of university
Free internet courses for young people
PCs available for public internet use (3)
Servicing of libraries of national research institute
Technical periodicals article index sold on CD-ROM or as web product

Library cooperation innovations since 1995
CALICO bringing together resources of 5 tertiary libraries
Conference organization
Consortial licensing/purchasing projects/publisher negotiation (14)
Electronic document delivery service
Electronic interlibrary loans
Electronic library cooperation
Electronic registration of reciprocal borrowers (5)
ELMET (Estonian) consortium for shared LIMS Conspectus and Digital Library
IT training to two local public libraries
National subject databases
Reciprocal borrowing (12)
Regional subject based gateway
Roquade, a highwire type publishing infrastructure
Unified readers card (3)

Other innovations in client services since 1995
Full text study books on the net
Integration with ICT services (2)
ISO certificates of document supply and internet processes
Service level agreements with all faculties
TQM (3)
TUT bibliography used for education purposes by university administration

Innovation specified in mission, objectives or strategic plan
(10)

Staff development program facilitates innovation and enterprise culture
(13)

Budget provision for innovation
(5)

Australian and New Zealand responses
A total of thirty nine responses were received. Twenty one were from Australian and New Zealand university libraries, and eighteen from other post secondary education libraries, principally those of technical and further education institutes. Some of the university libraries

are IATUL members.

Physical innovations since 1995
Adaptive technology laboratory (students with disabilities)
Client satisfaction surveys (5)
Coffee shop (2)
Color copying (7)
Consolidation of branches (3)
Consolidation of service points (4)
Drive by book return
Electronic reserve (5)
Electronic security system (2)
Electronic training suites (14)
Employment of international students as 'library buddies' for other international students
Flexible learning centre (2)
Improved disability access (16)
Incorporation of bookshop and community centre
Increased hours (9)
Increased role of paraprofessional library technicians (2)
Infokiosks (2)
Infolab (database room)
International Students Centre
Internet cafe
Laptop room/docking (4)
Light fiction reading for students
Multimedia room
Open reserve (7)
Postgraduate study rooms (2)
Researchers/Scholars Centre (3)
Self check loans (15)
Student learning centre
Telephone call centre
Time out space (comfortable cushions on floor etc)
Twenty four hour PC labs (3)
Videoconferencing facility (3)
Wireless trial

Electronic and nonelectronic information resource innovations since 1995
ARIEL document delivery (6)
Cooperative out of hours reference support with different time zone libraries (2)
Database expo days
Desktop delivery of documents
Electronic examination papers (3)
Electronic full text journals (19)
Electronic reference service (8)
Electronic requests for interlibrary loans (2)
Electronic requests for purchase
Electronic suggestions (3)
Interlibrary loans available to students
Library home page in four South East Asian languages
New titles lists on Webopac
Olympics website http://www.library.unisa.edu.au/vl/olympic
Remote access to databases (4)
Renewals by phone
Roving help (reference staff and student assistance for general IT support)
Self help document delivery
Self help renewals, holds, view borrowing details, links to electronic resources (5)

Services for distance students (3)
Time zone sharing of helpdesk with UK library
Virtual libraries/subject portals (8)
Web based FAQs (2)
Webopac lists to electronic resources

Information literacy innovations since 1995
Appointment of Information Literacy Coordinator (5)
Compulsory infolit subject - library provides classes, web and print self paced
Electronic tutorials for databases (3)
Establishment of library teaching and learning committee (TALC) to complement main university TALC
Faculty librarians involved in student lectures and course based assignments (3)
Faculty librarians participate in Introduction to tertiary teaching programs (3)
Generic internet and database classes (4)
Influence on university information literacy policy, teaching and research (4)
Information literacy as a graduate quality
Information literacy program for indigenous adults
Information skills compulsory part of common unit program for all undergraduates
Integration of information literacy into curriculum (8)
Librarians conducting regular electronic training programs offshore for students living in SE Asia
Online tutorials for undergraduates (4)
Organization of national conferences on information literacy
Organization of national workshop to develop information literacy competency standards for higher education and to establish an Australian Institute for Information Literacy (Sept 2000)
Outreach program - site visits to academic staff (5)
Pre university info literacy programs
Site licence for Endnote plus (2)
Unilinc webeasy - interactive web program for information literacy (2)
Web based support and teaching by librarians (4)
Workshops on weekends for part time and external students

Community access innovations since 1995
Certificate of Library Professional Practice
Commercial information service
Community membership program (3)
Consultancy services (2)
Electronic text collection access
Fee based internet training (2)
High school access to library's electronic resources
High school programs
Internet workshops for teachers
National Periodical Service for Schools
Saturday workshops available to general public
Single community borrowing allowing access to 3 university libraries
Specialist community programs eg Online Australia Day for senior citizens

Library cooperation innovations since 1995
Agreed supplied times for document delivery (2)
Consortium for resource sharing and reciprocal borrowing
Courier service
Electronic registration of reciprocal borrowers (7)
Exchange of senior staff to lead internal operational reviews
Joint photocopying card between 3 university libraries
Joint RFI between three university libraries for new library management system
Joint university libraries store (2)

Journal sharing (3)
Library science publishing
Reciprocal borrowing (5)
Registration of noninstitutional members without referral
Staff exchange scheme (2)

Other innovations since 1995
Year of the Client Client feedback scheme (3) Client charter/advertised service standards (4)

Innovation specified in mission, objectives or strategic plan
(8)

Staff development program facilitates innovation and enterprise culture
(5)

Budget provision for innovation
(4)

A scan through the above list of client service innovations suggests that most of them fall into the 'perceived to be new by the relevant unit of adoption' category. Few of them will be a surprise because librarians are adept at their information exchange, of which conferences such as this IATUL conference remain, despite the electronic revolution, an important part.

Nonetheless they should be a stimulus to thought about why and how they occurred. They do also demonstrate the wide range of issues and challenges all libraries worldwide are tackling - and they do not include the major innovations in academic library technical services over the past few years. It was particularly reinforcing to find that colleagues in Eastern Europe and South East Asia are well to the fore in their responses to these issues, many of which since 1995 have, of course, been electronically and information literacy focused.

Most libraries would agree with one survey respondent's observation that the 'Biggest change since 1995 has been how journals are provided and accessed'.

This change in itself is at once a benefit to clients but an impediment to that cooperation and community access provision to which librarians, more often than the institutions which employ them, aspire and achieve. Certainly in Australia and New Zealand the licencing restrictions of vendors and the restriction on internet access to bona fide students and staff of universities are inhibiting both library cooperation and community use of resources.

Despite this caveat, reciprocal direct borrowing arrangements for clients have been very long established in Australia and New Zealand, and are common. They appear to be increasing in Europe too.

The only website which could be found on library innovation is public library focused and is *Innovative internet applications in libraries*. This provides links to a number of relevant e-journals and websites. There would be scope for IATUL, or some other international organization, to develop a broad based website on academic library innovation.

Information literacy
Apart from the electronic focus, and in a way driven by it, there has been the increasing emphasis on information literacy as, what one Australian TAFE library describes in its strategic plan, 'the key competency for lifelong learning'. Lifelong learning, prompted by the 1996 UNESCO Delors Report *Learning: the treasure within is* the educational policy icon of the late 20th century, and doubtless of the next. Some libraries are asserting the essential connection between the information literacy and the lifelong learning concepts. Both concepts present definitional and realisation challenges, but information literacy at last is moving towards a degree of tangibility and assessment in higher education with the recent promulgation of the US ACRL Information Literacy Competency Standards. Although library initiated, earlier this year the standards were endorsed by the American Association for Higher

Education in recognition of their educational importance. A similar process is on track in Australia with a national workshop towards the adoption of information literacy competency standards for higher education under the aegis of the Council of Australian University Librarians (CAUL) to be held in September 2000 in Adelaide by the University of South Australia.

From the responses to the questions about information literacy initiatives, there are very many web based and curriculum integrated initiatives occurring around the world. Librarians *are* helping to drive educational change. Despite policy and attitudinal barriers to partnership within higher education, they are taking an educational lead. However it is also clear from some of the comments on the returned questionnaires that persuading university administrators and faculty that the world of information has moved beyond the current capacity of most individuals - students and academics included - to recognise and use it productively still challenges us all.

The internal library culture

At the end of the questionnaire three questions were asked about innovation and the library's mission, staff development and budgetary provision. A short paper like this cannot attempt to identify why and how, and to what effect, libraries innovate. This is an area, building on the seminal work of Clayton and others, which requires more research. However the relative lack of positive responses to the three questions begs the question as to how focused libraries really are on developing a culture of innovation and enterprise within their staff.

There are, of course, those who question the 'guru drivel' and the managerial preoccupation with passing buzzwords and phantom panaceas such as 'empowerment', 'reinventing', 'thinking outside the box', 'the cutting edge', 'enterprise culture', 'learning organization', 'knowledge management' and 'innovation'.

One librarian who has recently and amusingly done so is Will Marley in the May 2000 issue of *American libraries*. He castigates a job advertisement for a cataloguer.

> In addition to the usual requirement - MLS degree, two years of experience, three languages, computer programming skills, and a willingness to take a vow of poverty - they were asking for someone who could 'think outside the box.' It made me wonder what they were up to. Did this library want to create a new classification system, maybe a marriage of Melvil Dewey and Shiyali Ramamrita Ranganathan?
>
> Think about it. Do you really want your cataloger thinking outside the box? Maybe I'm old fashioned, but I want my catalogers to be *inside* the box, cranking out work so that the new books can get on the shelf and into the hands of patrons. I don't want them thinking up new subject headings or creating an 11th class for the Dewey Decimal System. I want them properly applying existing principles, with speed, accuracy, and efficiency - not creativity. Not only do I not want them out of the box, I want them belted to their seats and the doors to their boxes bolted.
>
> It's fashionable to praise the daring innovators of our world and take ordinary but productive workers for granted. The irony is that the workers are successful precisely because they stay in the box - quietly and modestly doing their jobs in a tried and tested manner in order to serve others and make the world a better place in some small way. My point is that in a world gone mad for the new, too little respect is given to traditional values and to those who live those values.
>
> Of course, one group in the library profession does need to get out of the box. It's always good when our managers leave the box to attend a three day seminar on getting out of the box. Those are probably the most productive three days in the library because the managers are not there to interfere with their 'out-of-the-box' theories.

Many of us at this IATUL conference are library managers. If Marley is right, in our absence our libraries will be having a very productive week this week. *Ergo* in the interests of library productivity, we managers should all go to more conferences preferably those requiring long, business class, travel.

Marley might be reassured that less than 20 per cent of respondents to the survey claim that their mission

statements or strategic plans specify the development of an innovative organization. The web search of university and library mission statements revealed that specific reference to innovation is unusual worldwide. This must surely change. In a presentation on organizational learning and knowledge flow earlier this year to the University of South Australia's Academic Board, the University President Professor Denise Bradley made an observation which is applicable to any university, and its library, seeking a place in the 21st century.

We must be an institution which readily changes to incorporate new ideas and new ways of doing things. More ambitiously, we aim to initiate and lead major change - through our academic programs and our research and development. For this to happen we must all concentrate more effort on understanding and, when necessary, changing the institutional culture. We will do this by

- sensing and understanding the environment to prepare ourselves for early adoption
- bringing together the intelligence and creativity of our staff so that we can engage in continuous learning and, thus, *innovation*
- applying what we have learned to enable us to take timely and purposive action

The only examples of wording supplied by libraries in their responses to the survey questionnaire which are consonant with Professor Bradley's words, are

> Our mission is to foster quality learning, teaching and research for the University and its communities through *innovative* and effective access to resources and excellence in service
> *Southern Cross University, Australia*
>
> We are responsive and *innovative*
> *James Cook University, Australia*
>
> The University Library will be recognised as an *innovative*, responsive provider of information services, valued for its contribution to learning
> *Edith Cowan University, Australia*
>
> Library plan includes 'uses a performance management model to identify key result areas for *innovation*'
> *University of South Australia*
>
> Vision statement includes 'foster staff who are *innovative* information specialists'. Critical success factors include 'Continuous learning, *innovation* and readiness for change'. Values include 'We embrace and reward enterprising and *innovative* ideas'
> *University of Wollongong, Australia*
>
> The Library is committed to meeting the needs of users by taking a leadership role in linking the University to information in a rapidly changing environment. The Library develops *innovative* strategies to select, organize, provide access to, and preserve information resources and the education users about their utlilization
> *Northwestern University, USA*
>
> The mission of the University of Toronto Library is to foster the search for knowledge and understanding in the University and the wider community. To this end, we shall provide *innovative* services and comprehensive access to information founded upon our developing resources as one of the leading research libraries in the world
> *University of Toronto, Canada*

Whilst the above will not be the total of academic libraries worldwide which have chosen to specify innovation in their statements of intent, to date a very low percentage have done so. Similarly it is unlikely that many libraries have staff development programs focused on innovation and enterprise, and even fewer have specific budgetary provision to facilitate innovation. The same would be true of many universities.

These limitations do not, of course, curtail innovation but they do nothing to stimulate and facilitate it. Many of us would empathise, and agree, with the words of Jüri Jäärs, Tallinn Technical University Library, Estonia in his survey response

> Innovation activities have high priority in the library strategic development plan, but there is nothing in our budget for these activities (for both staff and equipment). It was possible to realize the innovations described here only thanks to the grants and extra funding from different foundations, funds and institutions.
>
> So the source of motivation for library staff cannot be the money. *It must be something like the sense of mission or high professional awareness*. And of course, from 1995 we started regular staff training sessions on the general topic of information technology and its impact on the librarian and end user. Concerning the attitude of staff towards innovations, we never have had essential problems.

Does innovation need managing?

The critical question then is, should and can the development of an innovative enterprise culture be left to the 'sense of mission or high professional awareness' common in libraries? Or does it require a more managed context?

Amanda Sinclair, Professor of Management at the Melbourne Business School, here in Australia, has summarised the dilemmas and contradictions in a recent article. She argues that innovation necessarily derives from creativity, that the central ingredient for creativity is intrinsic personal motivation, that creativity requires active resistance to closure, and that the discipline of management is therefore inimical to creativity.

> Intrinsic motivation exists in inverse relation to extrinsic motivation: as extrinsic motivators strengthen, intrinsic motivation weakens. The more people perceive they are being controlled by management via extrinsic factors - salary bonuses and sanctions, share options, performance management incentive plans, ever more complex repertoires of carrots and sticks - the more their intrinsic appetite can dissolve.
>
> . . . Controls, routines, histories and habits - in short, organization - undermine creativity.

Academic libraries are no different to their universities in having to follow the pervasive trend to accountability and performance management dictated by governments, bureaucrats, public opinion and university governing bodies.

Although most academic libraries would pride themselves on client service proactiveness and responsiveness often ahead of the institutions of which they are part, they have tended to minimise the variation and unpredictability in what they offer, and have generally achieved a state of what Sinclair calls 'stunted, suffocating by predictable innovations'. Instead, if we are to heed Sinclair, academic libraries should be aiming to identify what no existing user has ever dreamed of, something which electronically is now well possible.

The consensus of the literature on innovation is that new organization rather than no organization and how much a learning organization it is, will be a major influence on the implementation of innovation.

Sinclair thus proposes that organizations which promote creativity and innovation typically have a number of features

- good people - colleagues with whom relationships develop over time
- a sense of pride and meeting creative command structures
- outcomes need to be perceived as valuable and contributing to people's lives
- smaller, because large and faceless organizations 'rarely inspire innovative performances'

This last point of Sinclair's seems plausible but, from the research, interactions between size and successful implementation are more complex than might be assumed.

Many libraries would have a close fit with Sinclair's organizational profile, but their leaders still need to

- encourage opportunity focused, not evaluative thinking
- provide leadership which helps create and share a vision and which models or demonstrates innovation. Innovative behaviour, while highly personalised is not an attribute one is born with but something which can be learned and communicated
- consciously address the obstacles to creative innovation
- see themselves as likely to be rewarded for success and not penalised for failure by their institutions
- find ways to forgo surveillance of the process in favour of trusting and supporting people to produce interesting outcomes
- relish uncertainty, ambiguity and risk
- ensure all staff who have identified innovative ideas and opportunities know how to exploit the opportunity
- most importantly, think about how to relax these sophisticated and complex control systems which dominate our time

These principles apply equally to universities and their leaders as a whole, and therein lies what at times seems to be an irreconcilable conundrum. The core of this conundrum is the need for overt public accountability in institutions which are often so large these days that much process and control goes into minimising risk and developing an integrated institution which in perception, and hopefully reality, is heading in more or less the one direction. Yet that very control and those very processes will be a barrier to innovation. In this situation the ability of individual leaders to stimulate, engage and empower an organization with a vision of a desirable and achievable future becomes very important.

As they do so, Clayton observes from his analysis of the literature, it needs to be borne in mind that

> . . . much of the confusion about the impact of organizational characteristics on innovation is due to the conflicting requirements for initiation and implementation of innovation … This certainly applies to characteristics such as complexity, low formalisation and low centralisation. The evidence associating these factors with successful implementation is slight.

Despite this, the internet stimulates innovation so splendidly because it is that open, neutral platform which physical, as opposed to virtual, universities, can never be. Yet the attempt has to be made, for as 16th century English philosopher, essayist and statesman Francis Bacon observed in his treatise *Of innovations*

> He that will not apply new remedies must expect new evils; for time is the greatest innovator

Academic libraries often lead their institutions in areas such as client service and feedback, staff development and asserting the importance of information literacy. Imaginative leadership in innovation can, and should, be another of their contributions. However this first requires more libraries to develop a specific vision of innovation, because it is this which will strongly influence the culture of the library, resources for innovation and those responsible for its implementation.

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IATUL

AFTER THE FIREWORKS: OPPORTUNITIES AND DIRECTIONS FOR UNIVERSITY LIBRARIES

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BACKGROUND

We live in a time in which the rate of change is unprecedented. While the nineteenth century saw tremendous innovations in technology, communications and public health that changed our lives during the twentieth century, we are now seeing a global transformation of social organisation. The dramatic technological developments both in information and communications technologies and in biotechnologies will continue to transform our lives but not, in themselves, as profoundly as the nineteenth century clusters of innovation in:

- electricity
- the internal combustion engine and transportation
- chemicals and materials
- entertainment, communication and information
- health and sanitation [1]

Instead, the "Information Revolution" is accelerating the rate of change as it pushes us faster into the 'Knowledge Economy'. That is, into the emerging world economy in which the greatest asset is intellectual capital, the knowledge which gives one organisation or one nation, or a partnership of organisations or nations, an advantage over others. Such an advantage may be found in the relatively new information industries or in the older extractive and transforming industries. For example, 50% of the world's mines use software developed in Australia, which has dramatically increased their productivity. Taiwan has become rich and influential as a manufacturer of the equipment used in the information industries: they have applied North American and European ideas to product development and are in the process of moving their manufacturing operations to mainland China [2].

As Castells [3] notes, the new paradigm has five characteristics:

1. *information is its raw material*, the technologies act on information not just information acting on technology;
2. the *pervasiveness* of the effects of the new technologies which are shaping all processes of our individual and collective existence;
3. the *networking logic* or topology which is well adapted to increasing complexity of interaction and to unpredictable patterns of development, and can be implemented in all kinds of processes and organisations;
4. *flexibility* in which all processes are reversible and organisations and processes can be reconfigured,

in a society characterised by constant change and organisational fluidity; and,
5. the growing *convergence* of specific technologies into a highly integrated system merging separate technological trajectories.

Thus, the information and communications technologies are both a product and signifier of that 'Knowledge Economy' and also facilitate acceleration of the rate of change. In common with other parts of the globe, but heightened by its previous isolation, nineteenth century Australia was radically transformed by the fast communication of news, commerce and personal matters following the completion of the Overland Telegraph and its connection to the British Australian Telegraph undersea cable at Darwin. The immediate global access offered by the Internet and the World Wide Web is similarly, but much more rapidly and extensively, transforming global commerce, international relations and the lives of individuals. The 304 million users of the Internet around the world can have immediate (or nearly immediate, bandwidth and "HTTP Error 404 Not Found" allowing) access to an enormous range of information. While we know the access is not without its problems, they are overshadowed by both its benefits and its potential, if only we can realise effective and efficient access in a universal and democratic fashion.

These developments have profound implications for education and for the world's information services. When information fuels the knowledge economy, libraries and information services are the carburetors and fuel injectors which make the information available when and where it may be required. In education we have moved from imparting a relatively fixed corpus of knowledge to an emphasis on skills, understanding and collaboration. In history, for example, the narratives of kings and queens, wars and conquests, inventions and discoveries have been replaced by the application of the techniques of investigation, analysis and synthesis. At all levels of education students are required to work in teams to investigate questions and develop understandings while absorbing the worth and skills of collaboration.

In higher education, rapid change is being driven by the catchcries of 'lifelong', 'open' and 'flexible' learning and the opportunities offered by 'eLearning'. Many universities are also considering the threats or opportunities posed by educational programs offered by or through powerful global entertainment corporations such as News Limited and Disney.

The rapidity of the change has been demonstrated by recent developments. A 1998 report noted, in discussing what it called the 'Death Star' scenario, "the involvement of global media networks in providing higher education has been overstated, ... [but some] companies are seeking to establish a presence as a carrier, rather than a provider, of educational content" [4].

However, two months ago, the Universitas 21 international consortium of 18 universities, including three Australian universities, entered into an agreement with Mr Rupert Murdoch's News Corporation to form a joint venture company to secure a substantial share of the global higher education market. Mr Murdoch welcomed the move, saying: "News Corporation has taken a strategic decision to enter the distance learning market using our global distribution platforms, our advanced technologies and our marketing reach. A mutually profitable partnership between leading providers in higher education and one of the world's leading media companies is a very strong proposition." [5]

Besides the emphasis on the profit motive, this initiative illustrates two responses to the challenges of globalisation. Firstly, the formation of *international industry alliances*: just as most of the major world airlines are linking themselves into the One World and Star Alliance camps, we see early signs of global university alliances. And, secondly, *partnerships to facilitate delivery* with powerful media and communications corporations. A third response, apparently not included in this initiative, is seen in *workplace based education and training arrangements* between universities and corporations (eg Deakin University and Coles Myer).

UNIVERSITY LIBRARIES

These developments and trends place university libraries in the spotlight as many of the issues centre around our business: information and knowledge. Not only do they concern the matters usually discussed in the context of the knowledge economy, mentioned above, but also the key questions of who, where, when and how? Who are (will be) the students? Where will they learn? When and how?

Will they have the skills to learn effectively in a networked environment? To what extent are those skills, the generic 'information skills' crucial to our students' futures, not only skills necessary to learn in an online world?

Of course, it is a truism to note that university libraries have evolved considerably from the wonderful Aladdin's caves of bibliographic treasures, typified by the Bodleian, Bibliothèque de Sainte Genevieve, Yale and many others to the information access services of today. Many have speculated about the creation of 'virtual' university libraries and some have reported on their initiatives such as Schmidt's description of the 'Cybrary' at the University of Queensland [6]. But we do not need a new name: the university library is still the place to go to get information to support study, teaching and research. Many of the processes and some of the functions have changed, but the purpose of university libraries remains. The 'place' that our clients visit is no longer only, or even primarily, the edifice comprising a box of books, study areas and services. Yale's telling inscription "This is not the Library, the Library is within" has acquired new resonance: "This is not the Library, the Library is with you". The information and knowledge that our clients use is not longer primarily found on paper. Our clients, however, still come to us to find information and knowledge: we continue to facilitate and mediate their access.

The traditional role of university libraries as the *holders* of scholarly information has diminished. In many fields, but not all, it is no longer necessary for students and researchers to travel physically to specific libraries which hold the resources necessary for their investigations. They can point and click to access remotely but this does not mean that the library has lost its importance. Far from it, the library is needed to bring together the services and make them available, with assistance, to clients while ensuring that licences are respected and invoices paid. It is needed to ensure relevance and appropriateness of information resources to facilitate the achievement of each university's particular goals.

THE CHALLENGES OF ELECTRONIC INFORMATION

The challenges posed by the shift to electronic publications are far from trivial. The questions of access, licensing, costs, and preservation have exercised our minds within our own institutions, through consortia and internationally. In this period of flux, there is much uncertainty. Both university libraries and our partners in publishing, database development, distribution and communication have many issues to address.

Not least among these is the creation of appropriate information architectures. Lately, we have seen much about portals and their importance to eCommerce, replacing the voluminous literature on gateways. But we, as information professionals, know that it is the entire information architectures which must be addressed. In this we move from our longstanding expertise in creating buildings for information related purposes to architecture in the sense of creating information structures which will store and make appropriately accessible digital information.

Behind these immediate issues are our traditional concerns with preservation and archiving. They include endeavours to establish deposit collections of digital publications in Portugal [7] and the National Library of Australia's attempt to "catch the rainbow" through archiving Australian content on the World Wide Web [8] and similar initiatives elsewhere in the world.

Many of the solutions to these challenges lie in collaboration. The development of consortia, often from pre-existing cooperative groups, has improved our bargaining position and brought some consistency to the market place.

INFORMATION SKILLS

One of the most important issues for higher education and for university libraries in particular is the efficient and effective provision of comprehensive and up to date information skills training. Not only is this vital for effective use of the modern academic library but the skills imparted form an essential element of the attributes expected of the graduates of our universities.

In my view such information skills training must be delivered in a variety of ways, employing flexible delivery, to meet the varied needs of our clients. There is no 'one size fits all' in information skills training. However, it is clearly of the utmost importance that the training be seen to be and be relevant

and timely. This can best be done by integrating information skills training into the curriculum. Through that strategic approach, students will value the training and benefit from its immediate application.

PEDAGOGICAL CHANGE

Our direct involvement in education goes much further. Traditionally, in many universities long seen as 'support services', university libraries are now being recognised as ever more integral to learning and research within higher education. Through that recognition, we can play an essential role in the refocusing of universities towards flexible, open and career long learning.

Pedagogical development demands continuing dialogue between teachers and librarians with emphases on client autonomy, information skills and the attributes of graduates through continual innovation. Through such conversations, librarians are engaging with the core of higher education and the necessary emphasis on quality.

RESEARCH

In supporting research through the provision of access to scholarly information and relevant data, libraries have extended into the laboratory and out to the field, providing tailored services in situ. In this respect many of the challenges can be summarised in Ranganathan's dictum "save the user's time".

But, as mentioned above, we must also assist researchers and particularly research students, the researchers in training, to develop their skills in acquiring and using information.

INTELLECTUAL PROPERTY

Many of these areas of concern have brought in their train greater consideration of the implications of intellectual property legislation and policy. We need to be concerned about the intellectual property issues related to the so called "Crisis in Scholarly Communication", the ownership and use of copyright material in our universities, and the implications of the trend towards licensing. Wider societal issues include the consideration of the moral rights of creators and the particular positions of indigenous peoples.

Technological convergence, mentioned above, is exacerbating many of these issues. The consequence has been nervousness and the resultant paralysis of many publishers and media distributors as they fear losing control of their content in a digital environment.

Similar fears of loss of control underlie the recent preoccupation with the control of 'offensive' content on the Internet, a preoccupation that has significantly plagued Australia, as well as some other countries. It has raised the serpent of censorship, which had been somewhat dormant in civilized nations.

INFRASTRUCTURE

University librarians must also guide infrastructure development, the implementation of increasingly integrated information resource access systems and the consequent adoption of knowledge management. There are a host of issues to be addressed in regard to the provision of adequate and accessible bandwidth to enable our students to learn. To that must be added workstations, information commons and other facilities. In developing nations there is a need for basic infrastructure: buildings and well stocked collections managed and supported by well trained staff.

TECHNOLOGICAL UNIVERSITY LIBRARIES

I must not finish without special reference to our libraries, the libraries of technological universities. Should we call them "technological university libraries" or "libraries of universities of technology"? I prefer the latter. Our universities have special characteristics and our libraries reflect them. While I do expect our libraries to have a strong technological focus, they share that with many other contemporary university libraries. Our libraries are distinguished by their focus on the interests of universities of technology: the focus on practice and the workplace. Thus we need not only consider the use of information resources in learning, teaching, research and scholarship but also its use in business, industry and professional practice.

CONCLUSION

There are of course many external influences, some of which I have touched upon in this paper. They include globalisation, multilingual and multicultural challenges, media developments and eWorld opportunities. However, the traditional emphases on ethics, professionalism and objectivity, and on cooperation and collaboration remain crucial as does our responsibility to think globally, endeavouring to address the implications for those in both developed and developing nations.

In closing, I wish to note the importance of IATUL and its capacity to further develop as a network of the world's libraries of universities of technology.

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IATUL

WATCH OUR LIPS!: NEW SKILLS AND SERVICES FOR THE KNOWLEDGE AGE

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Introduction
As countries work to develop strategies to help them to realise the economic, social and political benefits of becoming a society which is knowledge based, librarians and other knowledge workers are the pivotal professional group able to assist government to realise these aims. This paper describes how the Library and Information Association of New Zealand Aotearoa Te Rau Herenga O Aotearoa (LIANZA) has mobilised the library and information profession in NZ to present key messages to the new Government which describe a vision of how an integrated National Information Strategy(NIS)will help the Government to realise some of the benefits of this knowledge led world. Critical to the Association's campaign has been to draw these key messages and vision back into practical changes in the modern workplace. At the LIANZA Information Policy Summit (LIPS) held in Dec 1999 representatives of the library profession met to negotiate key messages from the profession which were then delivered to the Government. It was important for these messages to be picked up in a practical way by librarians, so this is also a story of how a national strategy is being implemented in practice in the workplace. Key strategists from outside of NZ are being invited by the National Library of NZ and LIANZA to advise the Government and the library profession on aspects of the national strategy. For example ***Knowledge Equity***, which includes information literacy, is one of the cornerstones of the National Information Strategy and librarians in all sectors throughout NZ are debating the issues and changing their practice in this area. There are new skills and services being developed in our libraries to maximise the potential of the knowledge age. In my view, to be effective these changes should be strongly linked by a national strategy.

While each country will have its own social and political environment the essential issues are the same, so as I take you through the NZ case study I invite you to draw parallels with your own countries.

Watch our LIPS !
Yes, it was a tacky title but it certainly caught the attention of the media! By inviting the Government to **"Watch our (LIANZA Information Policy Summit) LIPS ! Messages to the new Government"** the profession took the initiative and developed a vision which positioned the sector as the prime initiator in the development of a National Information Strategy for NZ. Representatives from all library sectors attended the summit, which was small (50 people) but effective. The most encouraging outcome of the summit was the high degree of agreement reached on the major issues. The LIPS messages were each linked to current government policies and demonstrated how the library profession and an integrated National Information Strategy could help the Government deliver these policies. LIPS was an opportunity that the library profession in NZ had been wanting for some time. It gave the profession a focus and delivered a vision of how the sector could contribute at a national level. The LIPS messages can be accessed on LIANZA's web site: www.lianza.org.nz

A National Information Strategy for New Zealand
As a direct outcome from LIPS during the early months of this year there has been extensive consultation with the library profession in NZ to develop the LIPS messages into a National Information Strategy for the Government to consider. Prior to this point, the previous Government's efforts to develop a strategy which would help NZ realise the benefits of a knowledge-led world had been

disappointing and very superficial. The National Government's Bright Futures 5 Steps Strategy was criticised by most education and research interests. It encouraged one sharp tongued journalist, Jenny Chamberlain from North and South and previously a librarian, to reflect "Why does the Government's 5 steps to a knowledge economy sound about as likely to deliver as 'Firm Thighs in Fourteen Days'?" *(North & South*, Oct 1999)

In contrast, the new Labour Government is making more appropriate statements; however they realise, as does LIANZA, that a more co-ordinated approach across several Government ministries is needed if these policies are to be effective.

There is nothing remarkable about the National Information Strategy model we are working with at the moment. Librarians will be very familiar with the main components we have identified. The strategy will be effective if the Government takes an integrated approach with co-operation and co-ordination across several ministries. As always there will be ego and power issues to resolve, but few people are likely to argue with the basic principles.

The Model: A first draft
(refer to 3 Power Point slides in Appendices)

There are three main components or building blocks in the NZ model:

1. Knowledge Access
This is about connectivity and the need for an integrated information technology infrastructure in a county. It assumes that a citizen in Invercargill in the far south of NZ will have the same access capability to Information Technology as a citizen in Wellington, the capital city.
Knowledge access fits well with two key Government policy areas relating to social and educational equity ("Closing the (social) Gaps" and the "Digital Divide").

2. Knowledge Resources
This looks at the knowledge base of the country and asks what information resources are freely available to citizens either through government funded agencies (including tertiary learning and research institutions) or Local Authority organisations.

The Knowledge Resources section of the strategy fits well with the present Government's initiatives in e-government and e-citizens, designed to make Government information more accessible to citizens. In the recent budget there has strengthening of funding for research and for the National Library of NZ. The Government is also signalling its intention to encourage more co-operation between tertiary providers. For a country which has just surfaced from a highly competitive, "let market dictate" regime, it could make interesting watching as Universities and Institutes of Technology adjust to the new environment! Resource sharing across sectors and organisations is likely to be encouraged.

3. Knowledge Equity
Knowledge equity is fundamental to the success of a National Information Strategy. It is based on the assumption that unless citizens are literate and information literate, they will be disenfranchised from many of the benefits of a knowledge society. A country which has a robust and integrated IT infrastructure and excellent knowledge resources for its citizens is not delivering on its information strategy if there are significant numbers who cannot read or read or write or access information.

The current New Zealand Government claims to be strong in this area of social policy. The Ministry of Education's Literacy Taskforce and the likely introduction of new legislation designed to close the social gap in many areas of social and educational equity suggest that good progress could be made. The challenge for the library profession in NZ will be to raise awareness of the importance of information literacy and technology skills as part of the literacy package.

International Comparisons
Some of you will be familiar with other countries' efforts to develop National Information Strategies. We have watched developments from *The Keystone for the Information Age: a National Information*

Policy for the UK April 2000 with interest. The three components of the UK model of Connectivity, Content, and Capability compare closely with Knowledge Access, Knowledge Resources and Knowledge Equity in the NZ strategy.

(Refer to Power Point slides in appendices)

The lobbying, the politics
During June/July 2000 LIANZA will be involved in an extensive lobbying campaign to progress the National Information Strategy. Progress so far has been promising, with a senior cabinet Minister offering to broker the concept with his cabinet colleagues. He is promoting a national summit involving key ministers including:

Education
Science and Research
Information Technology
Local Government
Communications
National Library of NZ
State Services (e-government)
Art, Culture and Heritage

The Minister with responsibility for the National Library of New Zealand will involve the National Library's Policy Secretariat (which has a policy advisory role to government) in drafting the National Information Strategy.

There will be a LIPS2! On the 27th July 2000 there will be another LIANZA summit to develop briefing papers in areas where we feel the library profession can advise the Government most effectively.

Topics of papers currently being prepared include:

- e-government / e-citizens
- a national consortium for data base purchase
- science and research information
- literacy and information literacy
- Local Government Act (redefining public good in public libraries)
- national resource audit
- Technology infrastructure including public Internet access

From strategy to action: using information literacy as a case study
So far in this paper I have talked about a macro strategy which is all encompassing and affects many aspects of Government and professions and sectors beyond library and knowledge workers. I have done this because I think it is important to put our own individual initiatives and developments within our own workplaces into a broader strategic and political context. In my view it adds purpose to our developments and encourages us to look outside of our own social, cultural, professional and political constructs and see the broader issues.

We have focussed on aspects of information literacy today, so I want to use information literacy as a case study and highlight how LIANZA is actively working on practical delivery strategies as well as lobbying for the broader issues involved in a National Information Strategy.

The following initiatives illustrate that while LIANZA is lobbying the Government on a national level, the Association is active in raising issues and debate within the library profession.

Some initiatives

- LIANZA establishes Information Literacy Working Party. The 1998 Working Party reports in May 2000 Library Life, the whole issue is devoted to Information Literacy.

- LIANZA Otago/Southland Weekend School Jan 2000. The main topic addressed is information literacy
- LIPS 2 July 2000. Briefing paper for Government prepared by the Information Literacy Working Party including an argument for strengthening the definition of information literacy in the schools' core curriculum
- The National Library of New Zealand in association with LIANZA brings key strategists to NZ to advise Government and the library profession on aspects of the National Information Strategy. July 2000: Information Literacy with Patricia Senn Breivik
- LIANZA prepares a submission to the Ministry of Education's information literacy task force August 1999
- Teacher training opportunities for librarians in various parts of the country are developed. (Diploma in Tertiary Teaching, Diploma in Teaching (Tertiary), Masters in Education, Certificate in Adult Teaching). Librarians with dual qualifications in library and information management and adult teaching are in high demand.
- COMLA seminar Oct 2000 in Christchurch is on Information Skills.

These are some examples of the commitment to putting a national strategy into actions which challenge and change professional thinking and practice in the workplace.

The changing workplace
This is the part of this paper where I move from a library association's political lobbying strategy to my own reflections as the immediate past Director of an integrated learning centre which included library and information services. (It may be worth noting that since I left the model has been deconstructed so you may not want to take too many notes!)

I confess to being a staunch integrationist! I have never been able to see the learning and research process as anything but a continuum. I don't think we assist the learning process by creating artificial boundaries which are essentially institutionally or professionally defined. Just as there has been convergence in technologies, so too have most of our "libraries" changed radically in the diversity of professional expertise needed to deliver services required. Each institution will have its own special mix to suit the learning and research needs of their particular learning culture. Information services combing IT with library and information services is a typical mix, but integration needs to go far further than this. (Power Point slides in appendices show the changing workplace, changing structures and blurring of traditional boundaries). Professional boundaries are blurring and it is, in my view, taking a particular breed of librarian with a lot of professional maturity to provide leadership in these changing waters.

Observations of common themes in the changing workplace
These are some observations of some typical changes in the thinking relating to information literacy.

- Educational alliances are being developed within organisations. Information literacy is not just a library issue. Team development and delivery is becoming more commonplace, and now academics, learning advisers and IT consultants are also part of the delivery mix.
- Librarians are taking the learning process seriously and looking at their own training deficits as teachers. Dual qualifications are highly desirable and library educators are being challenged to respond.
- Acceptance of a broad definition of information literacy is now more widespread, and we seem to have moved from our obsession with definition and the need to own it.
- In the teaching of information literacy there is a shift from teaching skills in isolation to presenting

these within a relevant and useful discipline context as an integrated and assessed component of undergraduate programmes. Information Literacy programmes are receiving the same scrutiny through programme approval processes that are applied to other courses or programmes.

- Information literacy is increasingly seen as an essential part of a graduate's learning profile it is seen as one of the core generic skills essential for learning throughout life.
- There is an increasing realisation that it is a staff learning issue (all staff) as well as a student issue. There are some intricate politics involved in this.
- Library managers are often leading and managing much more diverse professional groups or are part of more complex structures. The stand alone library is becoming an institution of the past.

Conclusion

The process whereby LIANZA has been negotiating a National Information Strategy for New Zealand was used here as an example of how a national political lobbying campaign can have direct relevance in the workplace. It has been argued that a national strategy developed in isolation from the practical implications within an workplace runs the risk of alienating professional support and professional wisdom.

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IATUL

THE YIELDS OF GROWING PROFESSIONAL PARTNERSHIPS

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WIDENING HORIZONS

New technologies invite expanded teaching and learning environments. They widen the horizons of education, open new training vistas, and challenge the views that have previously been held about methodology and strategies. Client expectations flourish as the fields of innovation grow. The service traditions of teaching and librarianship will always remain the root of good practice. However, there is an ever-growing demand for new strains of philosophy and methodology to meet the market demand for more seasonal, hardy and flexible vocational education and training products.

Technology's tools do have the capacity to increase the learning harvest. But it goes against the training grain, and there is very little gain, if new technology is wielded with old paradigms.

There's an old story about a bush tree feller who had wielded his saw and hatchet for many years. On one of his infrequent visits to town, the local tool salesman persuaded the tree feller to buy a new chainsaw, explaining that it could chop through tree trunks in a fraction of the time of his old equipment. It was some time before the salesman saw the tree feller again, but when he did, he asked how much more firewood he was now able to cut with his new chainsaw. He was stunned when the tree feller growled that the new tool took so much longer, and cut so poorly compared with his old one, that he had thrown it in the back of the truck in disgust and then left it there. The puzzled salesman said he had never before had such a dissatisfied customer. He asked the tree feller to bring the chainsaw to his shop so he could test it. Next day, the chainsaw was dragged from the very bottom of the truck's tray. The salesman yanked the lever on the starting cord and revved up the saw. "Hell," yelled the tree feller. "What's that bloody noise?

At Brisbane Institute of TAFE we *saw* that simply having the availability of new technology does not guarantee more productivity, or the development of more effective learning outcomes. Even with new technology, yields are still dependent on weather - whether those who wield the technology do so with understanding, clear intent, skill and discrimination.

Our library and delivery teams are determined not to become teaching and learning Luddites, forever looking longingly back to past pedagogues and spurning advances in delivery possibilities. Together we seek out new teaching and learning tools, investigate their capabilities and how best to apply them, and test their appropriateness in pilot programs. We seek to avoid the uninformed application of new techniques that could lead us barking up the wrong trees.

Vocational education and training might be growing, but the environment in which it is seeking to thrive has changed significantly. TAFE Institutes were once more sheltered from open market forces. Competition policy has forced public providers to share crop with private providers. The Australian Recognition Framework demands mutual recognition of the qualifications produced by all Registered Training Organisations. National Training Packages, which are driven by industry, focus on picking up workplace competencies, so that training organisations must till the knowledge and skills outputs expected on-the-job, as well as nourishing the training inputs off-the-job. Technology has opened the local market so that flexible training crops can be supplied by regional, interstate and even international

producers. New apprenticeships and user choice training purchases encourage employers to look around the market place, to examine what's on offer and choose training that has the most appealing texture and flavour for their enterprises. They are seeking delivery at specific times and places, packaged to meet enterprise and industry preferences. This includes delivery in their actual workplace.

TEACHER/LIBRARIAN PARTNERSHIPS

However, Brisbane Institute of TAFE (BIT) is also aware that introducing technology to training can propagate doubtful hybrids devoid of the educational integrity that sustains adult inquiry. Lifelong learning requires more than just prepackaged courses for learner consumption, whether on campus or in distance modes. It also requires modeling by those espousing it. This means that those sprouting life long learning should be thriving on it themselves. BIT staff look for the pollination of collegial support, teaming up with study buddies and cross fertilizing ideas from different employment streams such as library, teaching and administration, and different delivery areas from traditional trades to Information Technology.

The Institute has cultivated flexible options, including those employing technology, through teacher-librarian partnerships. When both step outside their usual furrows and plan, design and even deliver together, the capacity to meet diverse client needs grows. The seeds of the partnership strategy were in the Virtual Staff College concept. Through this program, TAFE Queensland Institutes nominated staff to enrol in the University of Southern Queensland's Graduate Certificate in Open and Distance Learning. At the Brisbane Institute of TAFE, cross-functional teams put forward business cases to produce flexible learning products for vocational training areas. The Flexible Learning Network, which grew out of the Virtual Staff College model, continued the librarian/teaching convergence. Librarians provide expertise beyond information sourcing, to incorporating the information literacy and information management skills that are the enabling skills of lifelong learning. They buddy up with teachers who contribute their technical and instructional design expertise. Through living the life long learning creed, both partners also undertake the technological upskilling required to graft new electronic species to long established industry and vocational skills.

PEOPLE AND PRODUCT SAMPLES

We would like to show you a bunch of products that have been produced by librarian/teacher co-operation. We will share their creation, cultivation and implementation.

Firstly a sample of projects demonstrating partnerships in product development

- Icons of Brisbane Image Archive
- Welders Certification Theory Online
- A Selection of Parasites in Dogs and Cats
- Web Templates

Icons of Brisbane Image Archive

Maurice Wilson (Heritage Parks and Gardens Teacher) and Janice Cook (Grovely Faculty Librarian) have developed the 'Icons of Brisbane' website at http://www.brisbane.tafe.net/icons. This site provides Brisbane Institute of TAFE web developers with an image archive of notable Brisbane landmarks for inclusion in web design elements such as banners and buttons.

Self-paced training notes at the site explain the development of a web image archive using Adobe Photoshop 5.5. Relevant links to sections in the Web Templates website are also provided (see Web Templates project below).

Welders Certification Theory Online

Kevin Bluhdorn (a Principle Teacher in the Metal Fabrication Team) and Pauline Fountain (the Flexible Learning Network Facilitator for the Gateway Campus) are developing Welders Certification Theory Online to be hosted TAFE Online at http://www.tafe.net.

Although Pauline is authoring Welders Certification Theory Online and Kevin is acting as the 'content' expert, Kevin will be a participant in the Web Design Intensive in Semester 2 2000. This will enable him

to keep the site up-to-date as well as develop further training products (such as 'Weld Test Inspectors and Supervisors Theory Online') to provide Metals Industry workers with more flexible access to post-trade training programs.

A Selection of Parasites in Dogs and Cats
Jane Wassell (Faculty Librarian) is a participant in the Monday evening Semester 1 2000 Web Design Intensive. Her project website is a learning resource for Animal Science students and covers a selection of parasites in dogs and cats. Jane is working as web author with Animal Science Teacher Patricia Clarke.

Web Templates
Sandra Lawrence (Business Studies Teacher and Acting Educational Design and Development Manager) and Mark Jones (Librarian and BIT Web Coordinator) developed the Web Templates Project to assist educational delivery teams develop a web presence on the Brisbane Institute of TAFE website e.g. Business Studies, Art & Design and Animal Sciences have used the templates.

The Web Templates website at http://www.brisbane.tafe.net/webtemplates provides access to self-paced notes about using Level 1 and Level 2 web template files, the digital camera, and developing web banners using fireworks. Faculty Librarians also use the Web Templates site to support staff training in digital technologies.

TWO SPECIFIC PROJECT SNAPSHOTS
Now to samples of projects demonstrating partnerships in both product development and product implementation or delivery

- Core and Foundation Competencies
- Macromedia Intensives

Core and Foundation Competencies
Rick Dale and Michelle Godfrey, Gateway Faculty Librarians have developed an Internet-based training and assessment resource available for Occupational Health and Safety and Industrial Relations, which can be adapted to any industry course.

In the trade-based areas it is currently utilised by delivery teams in Applied Engineering, such as Locksmithing, Glazing, Sheet Metal, Electrotechnology and Boat Building, as well as the Construction teams in Building and Stonemasonry. Although Rick and Michelle have been responsible for the web authoring and content customisation for each delivery area, they have done so in partnership with a range of Teachers, particularly, Peter Beatton (Stonemasonry), Alan Clarke (Electrotechnology), Geoff Weston (Workplace Learning Centre), Cliff Forrester (Locksmithing) and Bill Thomlinson (Glazing)

As well as developing the product, the Library team has pioneered the Project Supervision Model at the Gateway Campus where Faculty Librarians work as part of the delivery team. Teachers now have the option of clustered competency delivery of underpinning theory for Occupational Health and Safety, Industrial Relations, Basic Information Technology Skills and Workplace Communication Skills. Delivery modes include via the Internet at the Library Flexi Centre, or at the students' home, work or school (for school-based apprentices).

This project has migrated to the other campuses at the Brisbane Institute of TAFE. Janice Cook (Flexible Learning Network Facilitator and Grovely Faculty Librarian) has worked with teachers at the Grovely Campus to customise the Occupational Health and Safety web-based training product for Turf and Green, Horticulture and Floristry.

The Ithaca Faculty Librarian Team are finalising the customisation of the web-based Occupational Health and Safety learning and assessment resource for delivery areas that include Information Technology, Office Skills, Animal Science, Automotive areas and the remaining Construction Trades.

Macromedia Intensives

The Web Design Intensive 120 hour training program is a joint Art & Design and Library Service short course leading to basic web design, development and maintenance skills using Macromedia's Dreamweaver, Fireworks and Flash. The training team includes Robert Kinder (Art & Design Teacher), Pauline Fountain (Flexible Learning Network Facilitator) and Janice Cook (Flexible Learning Network Facilitator).

Courses to date have been scheduled in semester holiday breaks or evenings and have included:

- September 1999
- December 1999
- January 2000
- February 2000
- Semester 1 (Monday evenings)
- Semester 2 (Tuesday - Thursday evenings).

Course participants have been drawn from diverse backgrounds and include:

- small business owners/managers wanting to establish a web presence
- graphic designers upskilling in web technologies
- market-focussed artists wanting to develop online galleries for their work or wider-art collectives
- multimedia developers updating previous skills
- potential full-time students in graphic design and/or information technology (multimedia) wanting to 'test the water'
- trainers developing online learning options for their students.

Of the total client-base to date 27 of the 71 participants have comprised educational delivery staff from the Brisbane Institute of TAFE i.e. our Teachers, Tutors, and Librarians. Their website outcomes (developed by individuals or small groups) include:

- specific training websites incorporating online learning and assessment resources
- general training support and information websites
- websites developed on behalf of community-based organisations.

The online 'ad capsule' for the Web Design Intensives can be accessed at http://www.brisbane.tafe.net/projects/fln/macrointens.htm. This site also provides links to the parallel training support sites developed for each short course.

PREPARATION AND FERTILIZATION

We've all heard the old "as ye sow, so shall ye reap" adage yet it holds true for new training approaches. The preparation and fertilisation stages can seem long, and certainly require persistence and constant and vigilant husbandry. It does take time for something significant to surface. When teacher and librarian partners first set out to raise new approaches, there was much energy and activity below the surface of the Brisbane Institute of TAFE, as the roots of innovative possibilities developed. Project buds seemed to hold promise but they had to be nurtured with resources. Some of these came from Australian National Training Authority funds through Framing the Future and LearnScope programs, as well as a TAFE Queensland Revitalisation Funding Grant. The Institute invested staff time, training, technology and perhaps most important of all, the faith of Institute management that new training products, developed through co-operative staff tending, would indeed flourish. It is once the methodology was established, when the roots have been able to take hold and spread their tendrils across teams and mind sets, that the training growth spurt can occur.

REAPING THE REWARDS

Not all fields of Brisbane's Institute's vocational education and training have been technological tilled, nor are they all ever likely to be. The climate, environment and needs of some of our training holdings mean that technology will not readily transplant. Our strategy is to meet client demands and this will always be the overwhelming factor governing our resource production methodologies. However we believe that when we practice what we preach, when we give librarians and teachers the opportunities

and resources to learn new skills and apply them in their own fields of expertise, both reap the rewards along with our clients.

While we are keen to have the Brisbane Institute of TAFE absolutely blooming, we also have a commitment to the wider landscape of Vocational Education and Training. So we invite you all to grow professional partnerships of your own. Please take a packet of our seed with you and follow the instructions:

1. Plant the seeds of partnership with a sunny disposition
2. Provide the seeds with enough protection to ensure they become established, while not stunting individual growth
3. Be patient. Recognise that initial changes are occurring, even though they might be hard to see at first
4. Once you see the flowers, stand back, then harvest the blooms.

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IATUL

CREATING INFORMATION STRUCTURES THAT WORK FOR THE NEW MILLENNIUM

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"Historically, the purpose of organizational structures was to institutionalize stability; in the organization of the future, the goal of design will be to institutionalize change." [1]

While higher education is still criticised for being too slow to respond to changes in society and the environment, there is no doubt that the structures and practices of higher education are being transformed. Two conditions that have had a great impact on the speed of transformation have been globalisation and the incorporation of new information and communication technologies. Higher education is using new technologies to respond to the needs and the demands of the marketplace. However, higher education is still struggling to come to terms with the idea of the university as an economic enterprise including being a vehicle for promoting employment and economic development; while still retaining traditional collegial ideals such as academic freedom, tenure, self-governance, and the pursuit of truth or excellence. As such, we look for new approaches to organisational design to assist us in the competitive market of higher education. However, just as environmental factors do influence organisational design so do sociological and behavioural factors. In higher education both technology and internal power distributions have influenced the design of organisational structures. One theory argued by Jeffrey Pfeffer, in his book Organizational Design, is that design is an outcome of power and influence operating within organisations. As a result of this contest for control and power, work has become very routine. That the choice of technology, measured according to its routine, is a political choice as it allows management to avoid becoming dependent on the labour force [2]. There are other scholars who have picked up on this theme that during the twentieth century there has been a general tendency towards deskilling so that tasks are more mechanical and routine. Others have argued that technology has increased skill requirements, allowing workers to shed work that is mechanical and routine, to place greater value on information and knowledge, rather than manufacturing and commodities. This has created a new category of knowledge workers, workers who supposedly have more control over their own work. Whether or not you believe strongly in one theory or another, most managers and leaders are looking at creative ways to design and to implement organisational structures that are strategic and flexible enough to meet competitive challenges and social and individual expectations. "Rather than thinking in terms of decades, the pace of change in the environment will require the organization of the future to significantly change its underlying strategy on a regular basis of between 18 months and five years, depending on the industry. Indeed it is not uncommon to hear executives as they talk about strategic cycles, talk in terms of 'web years' signifying a compressed timeframe of three months rather than twelve." [3]

Integration of Library & IT Services

In order to meet their strategic goals, some universities have opted to merge areas based on the convergence of information and technology; changing service demands; and to create opportunities for increased cost effectiveness. In some institutions, the first step was to merge computing functions. Academic and administrative computing functions that may have been managed separately were brought together especially when more functions and applications were provided to the desktop. As advances have been made in telecommunications, network services encompassing voice, and data, were also brought together. Advances with audio visual technologies have added video to network services and all of these services were merged together into what is now commonly referred to as information technology services. As libraries' use of technology, and network services especially increased; and as IT service areas also had to start addressing increasing client service demands it is not difficult to see why

some administrators started to see linkages between these two areas.

As the pace of technological change increased, service requirements also escalated, at the same time that resources started to decline and competition increased. For some organisations these factors were the catalyst to devise a new organisational structure that focussed on a more inclusive, strategic approach to thinking about the university's information management and infrastructure rather than only seeing issues and environmental factors from a separate organisational unit perspective. The integration of library and IT services, therefore, has usually resulted in a team approach to problem solving. Lois Jennings from the University of Canberra wrote an interesting paper that described the why, how and what of integrating library and IT services at the University starting in 1993. Among the many benefits of integration, she highlights four areas of performance that she feels could not have been made as successfully by independent units. The ability to set a unified vision for information and communication for the campus; to translate this vision into a resources development strategy that lead to comprehensive policy development; that provided for improved services and also offered a range of new services; and lead to opportunities for staff development. "Opportunities were provided for staff to work beyond the boundaries of their own professional group and to work closely with other professional groups." [4]

The opportunity to work closely with other professional groups has probably been one of the major benefits of the integration of IT Services and the Library at the University of the Sunshine Coast. The University opened in 1996, and is the first new Australian public university on a greenfield site in 25 years. We realised even before the physical campus was opened that we would have to rely on information and communication technologies to realise our goals of connecting to the broader region, other universities and to business and industry. The University's strategic plan was unequivocal about the central importance of our regional role in catalysing economic and cultural advancement. We opened in an environment of intense competition, with a very limited funding base and scarce resources but at a time when reliance on information and communications technologies were rapidly accelerating. The first four years were our establishment phase. We were busy establishing the physical campus and infrastructure, recruiting staff and students, designing and implementing academic programs and services.

From 1996 to mid 1997, the Library and IT Services were two separate units reporting to different executive areas within the University. The University Librarian reported to the Vice Chancellor and was a member of the University's executive; and IT Services, composed of a very small staff headed by a consultant, reported to the University Registrar. Both areas were very focused on establishing resources and services as quickly as possible. However, as the Library had to provide print and electronic resources from its first day of operation, there was a realisation that in order for the library to reach its goals it had to communicate and to work in collaboration with IT Services. Self interest soon lead to an awareness that as a new institution still creating and developing its infrastructure we had a tremendous opportunity to design an information infrastructure for the University using the talents of both Library and IT Services staff.

The other significant development towards more collaboration was the construction of the Library, Information Technology and Educational Services building. A functional brief was prepared in 1995 and stipulated that the building would house the Library and the Computer Centre as one contiguous and integrated whole. The building, which was recognised by the Royal Australian Institute of Architects, as Australia's Best Public Building of 1997, has a very open floor plan that has been designed to accommodate large traffic flows and to allow for future flexibility. The use of offices has been minimal, in part to keep operational costs down, but also to encourage dialogue among staff. Library and IT staff are housed on the ground and first floors of the building; and to encourage synergies among staff there are no separate divisional areas for library and IT staff, even though until mid 1997 organisationally they were separate. Network and instructional technology staff are located next to systems and reference librarians; computer technicians and help desk staff are located next to Library lending services staff; and collection services staff are close to audio-visual staff. The administrative reception area housed both the university librarian and the manager for IT Services sharing administrative assistance. This was the planning scenario for the building and still remains. Today, most staff still work in an open office environment and the mix of staff with complimentary responsibilities and expertise is proving to be successful and has afforded many opportunities for synergy and for staff to promote these opportunities

themselves rather than being directed to do so. After five years, the University is now progressing from its establishment phase to a growth phase and as a result we are about to change our organisational design to include records management, archive, registry and reprographic functions into the mix with library and IT. The organisational design that is selected will be very important as not all functions will be housed within the Library building but the strategic directions of this additional merger is intended to focus on developing synergy and a consolidated approach to information management at the University.

Risks of Integration

So if there are many good reasons and outcomes for integration, why then do not more organisations consider such mergers and why have some mergers disappeared over time? One reason is perception – there is still a perception that the cultures of the two professional groups are different.

A paper presented in Shanghai in 1998 at the International Conference on New Missions of Academic Libraries in the 21st Century, outlined changes in academic libraries in Taiwan. A survey of library directors reported a preference for cooperative partnerships between libraries and computer centres to any administrative mergers on campus. In Taiwan, traditionally the library has had a higher position than the computer centre on the university campus. This along with the perception that there are many important differences between libraries and computer centres have discouraged Taiwan's librarians from supporting administrative mergers. [5]

Because of the convergence of information and communications technologies and the strong emphasis on electronic information, staff involved in the service delivery side of information have had to work more closely with technical staff. In some cases, there has been transference of some technical duties; not only within units, for example, reference librarians dealing with printer hardware support, but also among professions. For example, reference librarians dealing with network authentication and authorisation issues; and IT network or systems administrators answering more information literacy related questions such as 'okay now that I've logged into the network how do I search this database' at IT help desks. As Jennings noted in her paper, users focus on service outcomes and less on the organisational structures that deliver them. However, as technologies have created greater convergence between the library and IT professions, it has also created the need for more self-examination and in some cases an attempt to define both the "knowledge and domain of each." [6] Jennings also outlines the political risks of integration as other managers within the organisation may view the merger of budget lines as creating an 'empire.' Assuming that the new structure now has too much money and too many staff. This can lead to debates about centralisation vs. decentralisation and the value for money and control. Influence is another risk area, as most often the integration does result in policy formation based on strategies that go across organisational boundaries and may seem to be threatening to professional responsibilities especially between the traditional lines of general vs. academic staff. Most recently, this has been highlighted by flexible learning initiatives and some of the debates concerning accountabilities for the content verses design verses the technical delivery using educational technologies.

The Australian National University recently conducted a survey on library reporting lines and university administration among the Council of Australian University Librarians. Twenty-four out of the 39 university libraries responded. From the 24 responses, 12 of the university libraries reported that responsibility for both the library and IT services reported to the same executive area within the University, even if the library and IT services were separate units with separate directors and budgets. Some of the libraries reported positively on this development in that it may create an opportunity to address a comprehensive information policy for the university rather than just from a divisional or organisational unit perspective. Also it may be an opportunity to develop an information policy for the university within a scholarly context rather than just addressing infrastructure issues from a resourcing perspective. From these 12 libraries, 4 libraries reported having a university librarian responsible for both library and IT services. The survey results highlight that even without total integration, but with a common reporting line, there are probably more opportunities for communication, cooperation and certainly increased insight into the issues of the other operating area.

Designing for the Future

If we accept that fact that external factors, in particular, have a great impact on the design of organisational structures, then how do we organise for a future that is rapidly ever changing, and/or one

that perhaps we cannot foresee? Perhaps more than ever we need to look at scenario planning to strategise around probable futures. Our decision making tends to become more complicated as the future becomes more difficult to predict and to control. Some researchers have applied a transaction costs theory to organisational design and briefly the theory is that the more uncertainty we face, the higher the risks for market failure which leads to hierarchical relationships to control transaction costs to protect profit margins. [7] An over-simplified observation of this theory is when it gets tough and confusing, it is human nature to return to something known including an organisational design that is more familiar, centralist and provides more control. However, if information and communication technologies continue to develop, and there is no reason to doubt that this is not the case, then perhaps the only way for higher education to survive is to design organisational structures that enable flexibility and responsiveness to change.

Recently I read an opinion piece in The Chronicle of Higher Education that looked at a near future of a "tuition free college degree based on mass produced distance education." [8] Online education seems to have created a price war as more providers, both from commercial non-university companies and from higher education, enter the marketplace and as they begin to cooperate and to collaborate. US entrepreneur Michael Saylor, CEO of MicroStrategy, recently announced that he was funding $100 million dollars of his own money to develop an online university, offering an Ivy League quality education free of charge. We have also seen many other examples of what were once paid services now offered for free because of e-commerce opportunities, e.g. hosting of email accounts and web pages. The author of the opinion piece, feels that the alliance between an educational institution and an e-commerce company or companies will be able to offer tuition free online education. Not only will the real money not come from online advertisements that the student may view before, or even during, the lecture; but rather from the shopping portals that would be tailored to meet the interests of the student. He sees the portals as being profitable revenue sharing agreements, with commercial sites sharing a percentage of sales with the educational site that has provided the link.

Key to Organisational Design

Whether or not you chose to believe this 'future' it serves to illustrate as an example of the rapidly emerging education markets and the subsequent dramatic changes that are facing higher education. How universities develop strategies in response to this type of future may impact on the organisational designs that they experiment with. Jerry Campbell from the University of Southern California believes that any information infrastructure for the future must accomplish four key objectives. [9]

1. It must achieve a new level of cost effectiveness. Improving on staff productivity while reducing human intervention means that traditional approaches may have to be abandoned or as others have indicated if it doesn't add value stop doing it.

2. It must create a higher level of service. To do so probably will require greater resource allocations, new skills, and the willingness to select opportunities.

3. It must develop a true research and development capability. By thinking creatively we can redesign our work to be innovative, therefore creating value and also to create new opportunities for emerging markets.

4. It must rapidly develop and make rational a new, flexible organizational culture that includes a broad range of skills, and creates espirit de corps around a new and powerful mission. Values, culture and shared goals become more important and may require many of us to think outside the square of our current profession and/or our current comfort zones. Knowledge workers may have to be managed, if at all, in new and different ways. Conflict management and negotiation skills may be even more important in an organisational structure designed to change frequently and rapidly in response to emerging opportunities.

If one of the goals of design is to institutionalise change, then there will not be one perfect design to model. As the strategic foci of our institutions change, so too may the organisational design change. Being able to design and to implement innovative and strategic organisations, quickly and effectively, is becoming an important skill for managers and leaders expected to act as change agents and

entrepreneurs. It is a challenge, not only for the designers, but also for all of us working within the higher education environment. Hopefully it will be seen as a positive challenge and who knows you may even have a longer and more satisfying career!

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IATUL

FACING THE CHALLENGES OF TRANSITION: THE NEXT GENERATION LIBRARY

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On the verge of the 21st century, librarians recognize that fears of irrelevancy were greatly exaggerated. Today they carry on their work in a hybrid library environment. The revitalized role played by librarians in the Internet economy has forced an examination of processes and functions within libraries and librarianship. As the dust from the information revolution settles, the staff at the Linda Hall Library, like library workers elsewhere, provide a continuous tradition of service with an entirely new attitude.

Librarians worldwide spent the last decade scrutinizing the past and speculating on the future. IATUL members from the University Library Twente, Maarten Van Bentum and Johanneke Braaksma explore the future of libraries through an analysis of changing user needs. Stuart Sutton of the San Jose State University reviews the past and conjectures about the future through a presentation of reference service as provided in model library types. In an effort to gain an understanding of our position and achieve the most we can under new circumstances, a holistic examination of library models is in order.

The traditional library of the past century was a physical entity with a specific geographic location and a defined local user group. The users were affiliated with the body that controlled the financial status and budget of the library through taxes, government funding, tuition, or subscription. The user group defined the type of library and its contents. The library primarily contained print books or serial publications and in the latter half of the 20th century expanded to micro formats. Reference service was performed on-site to walk-in or telephone patrons. Access to the materials in the collection was made available through paper indexes, holdings lists, and the card catalog. Interlibrary loan was performed for affiliated users whose information needs were not fulfilled by the local collection. When the Linda Hall Library opened its doors in 1946, it appeared to be a model of the traditional library. A notable distinction between the Linda Hall and other libraries was that it was born from the generous bequest of a Kansas City grain merchant and his wife, Herbert and Linda Hall. The Halls defined the users of the library in their Wills as "the people of Kansas City and the public generally." Joseph C. Shipman, the first director, secured the library's foundation as an institution known for both its quality science and technology research collection and its exemplary reputation for service.

The next evolutionary step taken by libraries has been called the "automated library." In retrospect, the automated library was identical to the traditional library with the minor distinction of computer-based catalogs and indexes, and access to online library utilities such as OCLC and RLIN. This was a distinction in format alone. The user group remained the same and services provided remained the same; nonetheless, the new access tools shook the foundations of the library world and "technostress" was a common and frightening complaint. Librarians everywhere reevaluated their roles within the profession, asking fearsome questions. Would the profession become irrelevant? Could they learn new technological skills as rapidly as required? Would the book itself, an item of iconographic stature, cease to exist?

More recently, discussions in the literature have centered on the "hybrid library." The hybrid library further advances the idea of the automated library and most librarians today describe their institutions in terms that define this concept. In a hybrid library, materials in electronic formats are used as readily as paper and micro formats. The online catalog and electronic indexes are standard. Reference service is still primarily conducted through traditional avenues, but reference services are also accessible in new ways. By embracing the new technologies, librarians have discovered that thoughtfully composed web pages can provide gateways to information required by their patrons, web forms present a new means by

which users can ask questions, and lists of frequently asked questions are common timesavers for librarians and patrons alike. The library is no longer limited geographically, but opportunities for expansion of services continue to be severely curtailed by limitations on membership to the community of users. In recognition of the changing role of librarians and changing use patterns of the library clients, the Board of Trustees formalized the position of the Linda Hall Library in a mission statement. The statement touched on all areas vital to the existence of a premier, hybrid library. More importantly, the mission encouraged adaptation, growth, and leadership in the new information environment, recognizing that "the public generally" included "local, regional, national, and international education, research and development" communities.

Today the professional literature of library and information science is dominated by discussions on the "digital" or "virtual" library. The concept of the virtual library is that of an entirely digitized collection. Given the prevalence and relative permanence of printed information, the short life of electronic information, the ramifications for copyright, and the cost of digitizing 400 years of accumulated printed information, it is unlikely in the near future that an entirely digital library will replace the hybrid type as a whole, with the possible exception of some small collections. The definition of the virtual library as a collection continues to neglect an integral part of libraries, the non-traditional patrons. While creating the bridge between the hybrid and the virtual library, librarians need to reject old, rigid patterns of affiliated membership to include the virtual user who exists outside the traditional, closed community. Librarians and patrons alike are frequently dissatisfied with the limitations of the hybrid library. In a world where access to information is no longer bound by hard covers, why should the community of users be limited? In its efforts to push the limits and develop a virtual clientele, the Linda Hall Library has gone beyond the hybrid model to become what might be called the "Next Generation Library." This distinction differentiates between the hybrid library's focus on material storage and access, and the Next Generation Library's emphasis on delivery and value-added service to all potential users. P> At the Linda Hall Library, the process of engaging change was incremental. In the early 1990s, the staff and Board of Trustees of the Linda Hall Library recognized that it was time to move forward if the library was going to become a premier institution. Unencumbered by many of the pressures confronting most libraries serving universities and with a willingness to take advantage of the new information economy, the Linda Hall Library was ripe for change. This juncture in library history coincided with the birth of the World Wide Web and for the Linda Hall Library, a change in leadership. C. Lee Jones joined the library staff as its President. Under new progressive leadership, it became imperative to take a fresh look at old procedures. P> One of the most important steps for any institution desiring permanent, fundamental change is the reassessment of traditional job functions and the accompanying revision of staff structure. The Linda Hall Library was comprised of departments that conformed to established library patterns: reference, loans, and technical services. These patterns were given careful scrutiny and based on that reassessment, each department developed its own internal structure, functioning under the most efficient way to conduct operations. For example, through an assessment of the job functions within the Reference Department, in addition to traditional reference service, each librarian gained oversight for a program: Education, Search Service, Patents and Trademarks, etc. The Loans Department became Document Services. This department was arranged around processes: receiving requests, copyright compliance, verifying and marking requests, etc. Recognizing the new direction of user services, Document Services and Reference merged under the umbrella of Information Services while retaining their unique identities. The Systems Department was created for supervision of the online catalog and other computer systems. The administrative Operations Group was established, bringing inter-departmental communication to a new level. Flexibility of structure within and between departments has allowed for the most efficient use of staff and engendered a broader sense of responsibility. It has instilled a culture of adaptability to a changing environment. This initial push brought the library to the level where it fit the hybrid model and provided staff with the essential tools and skills needed to excel in that environment.

The next step in the evolution of the library began in the mid-1990s. The library staff set in motion a concerted effort to understand and attract a new clientele. This was accomplished in three ways: membership with library and information organizations, relationships with science and engineering associations, and the implementation of flexible services. Activities at library conferences exposed the staff to other professionals in the information business. A promotional video shown at these conferences gave outsiders an inside look at the library. Through liaisons with science and engineering societies, the

administration identified key clientele and arranged interlibrary services to meet their needs. The quality of the collection had already attracted the notice of a worldwide audience. Local users were aware of the library's reputation for quality service, and librarians at the Linda Hall Library began to take advantage of the Internet to extend that service to virtual customers. Four tiers of reference service became available to library patrons. These services were particularly useful to remote patrons who could not conduct their own on-site research. First, in a move that was typical of hybrid libraries, traditional reference service became available to patrons using email. In addition, two services were added, the Search Service and Bibliographic Verification Service. The former service provides literature research as specified by the client. The latter is performed specifically in conjunction with a document delivery request when a patron has incomplete citation information. The fourth kind of reference service is performed behind the scenes, without patron request. Any document order that is unable to be filled is always subject to the scrutiny of the reference staff, assuring accuracy and continuous quality service. Cost recovery charges are made for specialized services only when the patrons needs are met.

As a direct result of these efforts, professional societies regularly approach the library to take on their collections of formally published and gray literature, and to provide services to their membership. Individual members of these societies are generally unaware that the physical location of the library is Kansas City, Missouri because electronic services make the physical location irrelevant. In this way, a virtual clientele was developed and simultaneously the collection was enriched. Due to the reinvigorated reputation of the library for its collection and service, the virtual clientele continues to expand, unfettered by traditional constraints. The library's usage statistics over the past decade speak to the success of these strategies. In 1989, operating in the automated stage, the library received 30,588 requests from off-site patrons. In 1999, the number grew to 107,461 requests. Only through deliberate efforts has the library grown into the Next Generation stage of development.

Librarians recognize that in order to survive the tumult occurring in the information industry and to adapt to the new Internet economy, an examination of neo-traditional operations must continue. For example, publishers of short life span e-journals could collaborate with libraries capable of meeting specified criteria to arrange a permanent archive. Another case in point, in an electronic environment, issues of access become issues of delivery. In an effort to improve delivery procedures, the Linda Hall Library is migrating its operations to the ILLiad system. ILLiad is a document delivery management and tracking system, which will allow transparent and seamless delivery of electronic documents. It will be faster and more cost efficient, a benefit both to the users and the library. The Linda Hall Library's implementation of this system is called DocServ.

The Linda Hall Library has established itself as a leader in the provision of information to researchers worldwide by taking steps to create change. The library engaged in an analysis of its mission and procedures; adapted its use of technology and services to achieve its goals; promoted its collection and services to information and research communities; and developed a work environment conducive to change. Having aggressively pursued a new face during the last decade, that of the fast-paced, high-volume, document delivery library with a worldwide, remote client base, it serves now as a model for technological research libraries seeking a virtual presence. Changes made in the past decade have dramatically increased the number of items provided through document delivery and the number of library users, enhancing its presence and institutional stature in both local and remote research communities. The Next Generation model allows the Linda Hall Library to fulfill its mission successfully. This model is adaptable to most library environments. It satisfies the needs of library customers in the current Internet economy, while maintaining the flexibility to evolve for future generations.

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IATUL

VIRTUAL LIBRARIES: INTERACTIVE SUPPORT SOFTWARE AND AN APPLICATION IN CHAOTIC MODELS

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Introduction

We are living in a world that is becoming more and more complex. As individuals and as societies, people are finding it increasingly difficult to cope with a world that daily becomes more complex and uncertain.

Uncertainty is stalking organizations and institutions, and as such libraries too. These bastions of order, regularity, and stability are now under threat. The crises affecting the general level of society also affects institutions. Currents of change are rolling through every domain of society, shaking the stable state. Today there is no established institution in society that perceives itself as adequate to the challenges it faces. There is an evolving shared vision of the new information world. It is a world of ubiquitous, reasonably priced digital information in any and all media, available to everyone from a computer, television, palm, or wrist, as predictable, ordinary and universal as a toaster. Traditional universities are being placed with cyber-universities. If existing universities do not reform quickly, they will decline into irrelevance. They have to work together to create a series of regional and national resources centers to assure that scholarly resources are acquired and preserved (11).

In the digital age, a fundamental question is often overlooked. That question is are libraries being pushed by the past or are they being called by future? (5). The truth is that we cannot forecast with any degree of certainty the mindset of future "information societies (4).

A digital library will provide a range of searching and browsing tools. This seems to be universally accepted, not least because a digital library, unlike a traditional library, will be unusable without a full array of such tools (1).

The characteristics and the singularity of Chaotic Systems

Sir Isaac Newton brought to the world the idea of modeling the motion of physical systems with equations. It was necessary to invent calculus along the way, since fundamental equations of motion involve velocities and accelerations, which are derivatives of position. His greatest single success was his discovery that the motion of the planets and moons of the solar system resulted from a single fundamental source: the gravitational attraction of the bodies. The circular, elliptical, and parabolic orbits of astronomy were no longer fundamental determinants of motion, but were approximations of Laws specified with differential equations. His method is now used in modeling motion and change in all areas of science.

Subsequent generations of scientists extended the method of using differential equations to describe how physical systems evolve. But the method had limitations. Scientists knew of systems, which had more complicated behavior, such as a pot of boiling water, or the molecules of air colliding in a room. However, since these systems were composed of an immense number of interacting particles, the complexity of their motions was not held to be surprising.

Around 1975, after three centuries of study, scientists in large numbers around the world suddenly

became aware that there is a third kind of motion, that we now call "chaos". The new motion is erratic, but not simply quasi periodic with a large of periods, and not necessarily due to a large number of interacting particles. It is a type of behavior that is possible in very simple systems.

Dynamic Systems Theory

In the present day, scientists realize that chaotic behavior can be observed in experiments and in computer models of behavior from all fields of science. The key requirement is that the system involves a non-linearity. It is now common for experiments whose previous anomalous behavior was attributed to experiment error or noise to be reevaluated for an explanation in these new terms. Taken together, these new terms form a set of unifying principles, often called dynamical systems theory, that cross many disciplinary boundaries. A dynamical system consists of a set of possible states, together with a rule that determines the present state in terms of past states.

The theory of dynamical systems describes phenomena that are common to physical and biological systems throughout science. It has benefited greatly from the collision of ideas from mathematics and these sciences. The goal of scientists and applied mathematicians is to find nature's unifying ideas or laws and to fashion a language to describe these ideas. It is critical to the advancement of science that exacting standards are applied to what is meant by knowledge.

Those standards of mathematicians and scientists are rather different. Mathematicians prove theorems. Scientists look at realistic models. Their approaches are somewhat incompatible. The first papers showing chaotic behavior in computer studies of very simple models were distasteful to both groups. The mathematicians feared that nothing was proved so nothing was learned. Scientists said those models without physical quantities like charge, mass, energy, or acceleration could not be physical studies. But further reflection led to a change in viewpoints.

Finally, laboratory experiments began to be carried out that showed unequivocal evidence of unusual nonlinear effects and chaotic behavior in very familiar settings. The new dynamical systems concepts shaved up in macroscopic systems such as fluids, common electronic circuits and low-energy Lasers that were previously thought to be fairly well understood using the classical paradigms. In this sense, the chaotic revolution is quite different than that of relativity, which shows its effects of high energies and velocities, and quantum theory, whose effects are submicroscopic. Many demonstrations of chaotic behavior in experiments are not far from the reader's experience.

Period Three Implies Chaos

Over the past decade chaos has become a very lively subject of scientific study, among with the periodic orbits for continuous maps and the idea of sensitive dependence on initial conditions. The existence of a period – three orbits along implies the existence of a large set of sensitive points, is infinite.

A chaotic orbit is a bounded, non-periodic orbit that displays sensitive dependence. When we give a precise definition of chaps, we will find that the discussion is simplified if we require a stronger definition of sensitivity, namely that chaotic orbits separate exponentially fast from their neighbors as the map is iterated. A much simpler fact about continuous maps is that the existence of a period three orbit implies that the map has periodic orbits of all periods. This fact doesn't say anything directly about sensitive dependence, although it guarantees that the map has rather complicated dynamical behavior.

It is one thing to find "chaos" in a mathematical model. A much more significant finding would show that the model is true enough to a real-world system that its chaotic behavior can be reproduced in the laboratory.

The concept of an unstable steady state is familiar in science. It is not possible in practice to balance a ball on the peak of a mountain, even though the configuration of the ball perfectly balanced on the peak is a steady state. The problem is that the trajectory of any initial position of the ball near, but not exactly at, the steady state, will evolve away from the steady state. The ball eventually moves away from the peak and settles in a valley, at a lower altitude. The valley represents a stable steady state. One type of behavior for an initial condition that begins near an unstable steady state is to move away and be attracted by a stable steady state, or perhaps a stable periodic state. It is common to see behavior like

this, in which unstable behavior is transient and gives way eventually to stable behavior in the long run. But there is no reason that an initial condition starting near a source is forced to end up attracted to a sink or periodic sink.

A chaotic orbit is one that forever continues to experience the unstable behavior that an orbit exhibits near a source, but that is not itself fixed or periodic. It never manages to find a sink to be attracted to. At any point of such an orbit, there are points arbitrarily near that will move away from the point during further iteration. Lyapunov numbers and Lyapunov exponents quantify this sustained irregularity.

Fractals

A fractal is a complicated figure, does not simplify when it is magnified. In the way Euclidean geometry has served as a descriptive language for the classical mechanics of motion, fractal geometry is being used for the patterns produced by chaos. Trajectories of the two-body problem, for example, consist of conic sections: ellipses, parabolas, and hyperbolas chaotic attractors, on the other hand, often have features repeated on many length or time scales. Scientists know a fractal when they see one, but there is no universally accepted definition. B. Mandelbrot, a mathematician at IBM, coined the term "fractal" in the 1960´s. It is generally acknowledged that fractals have some or all of the following properties complicated structure at a wide range of length scales, repetition of structures at different length scales (self – similarity), and a "fractal dimension" that is not an integer. Perhaps the simplest geometric object that deserves to be called a fractal is a cantor set.

Chaotic Attractors

An important aspect of explaining dynamical phenomena is the description of attractors. Newton knew of two types of attracting motion that systems settle into: the apple sitting on the ground is in equilibrium, and the planets in the solar system are undergoing periodic, or more properly quasiperiodic motion, at least to good approximation. For the next 300 years, these were the only kinds of motion know for simple dynamical systems. Maxwell and Poincare were a small number grew, but it was not until the widespread availability of desktop computers in last quarter of the 20th century that the third type of motion, chaos, became generally recognized.

If chaotic motion is to be observed in the motion of a physical system, it must be because the set on which the chaotic motion is occurring attracts a significant portion of initial conditions. If an experimentalist observes a chaotic motion, he has chosen often randomly, an initial condition whose trajectory has converged to a chaotic attractor. This motion could perhaps be described as "stable in the large" (it attracts a large set of initial conditions) while " Locally unstable" (it is a chaotic orbit).

A chaotic orbit is not periodic or asymptotically periodic, and it has at least one positive Lyapunov exponent. On the other hand, a chaotic attractor is a forward limit set. It is in some sense what remains after throwing away the first one thousand, or one million, or any large initial number of points of a chaotic orbit. That means that the orbit continually returns to the vicinity of these points far into the future. The definition of forward limit set of an orbit is the set of points to which the orbit returns arbitrarily close, infinitely often. Points in an orbit may or may not be contained in its forward limit set. The forward limit set may have no points in common with the orbit, as is the case with the forward limit set of an orbit converging to a sink. In this case the forward limit set is one point, the sink that is approached by the orbit, as closely as you specify and as far forward in time as you want to require. The orbit is attracted to the sink.

What is an attractor?

The term attractor is used for the forward time limit of an orbit that attracts a significant time limit of an orbit that attracts a significant portion of initial conditions. A sink is an example, since it attracts at least a small neighborhood of initial values.

An attractor should be irreducible in the sense that it includes only what is necessary. The set consisting of the sink together with one of the orbits approaching the sink is also a set that attracts initial conditions, but for the reason that it contains the sink. Only the sink is actually needed. Irreducibility is guaranteed by requiring that the attractor contain a dense orbit, an orbit that comes arbitrarily close to each point in the attractor.

Besides irreducibility, the attractor must have the property that a point chosen at random should have a greater- than – zero probability of converging to the set. A saddle fixed point is irreducible in the above sense and does attract orbits for example, the one whose initial condition is the fixed point itself. However, this initial condition is very special; the definition requires that an attractor must attract a set of initial values of nonzero state space volume.

Chaos introduces a new twist. Chaotic orbits can be attracting if the forward limit set of such a chaotic orbit contains the orbit itself, and therefore contains a dense orbit, then the attractor is a chaotic attractor.

Concluding all the above, there are four very important characteristics of the chaotic systems that have effect to our application:

1. Apparently, insignificant inclinations, enlarge through the pass of the time. In other words, very small causes can produce very big results.

2. Chaotic systems are dynamic systems, and their behavior are chnaging through time.

3. Chaotic systems looks like fractals. They tend to reproduce the same pattern in all the measure scales.

4. Chaotic behavior is a result of the feedback between the parts of the system.

The very important characteristic of the chaotic systems, that interest us, is that their behavior is never reproduced in the same way wherever is the starting point of the system, we are not in a position to describe its certain path till the end. Very small changes relating to the starting point can cause parths with big differences.

The behavior of chaotic systems is changing through time, and it is an emerging procedure. That means that we are not in a position to know the evolution of the system from the beginning and there is a need to follow the procedure from the beginning to the end. Researchers and scientists want to know not only the final picture of the chaotic system, but also the "born" of the system, the certain path it will follow and the way it will conclude in a period of time.

For all the above reasons, libraries must be in a position to provide this new service. This can be done with the software we will establish.

The Digital Libraries concept and the appropriateness to chaotic models

Definition
The virtual library has been defined as the concept of remote access to the contents and services of libraries and other information resources, combining an on-site collection of current and heavily used materials in both print and electronic form, with an electronic network which provides access to, and delivery from, external worldwide library and commercial information and knowledge sources. In essence, the user is provided the effect of a library, which is a synergy crated by bringing together technologically the resources of many, many libraries and information services (11).

In 1995 statement, the US ARL identified 5 very general elements common to all definitions of the digital library current in the first half of the decade:

1. The DL is not a single entity.

2. The DL requires technology to link the resources of many libraries.

3. Linkages between DL and information services are transparent to users.

4. Universal access to DL is a goal.

5. DL collections are not restricted to document surrogates but include digital artifacts that have no printed equivalent (1).

The digital library we have started to construct and propose here fulfills all the characteristics of the above definition as well as the following basic potentials:

1. Reduces constraints for time and space,
2. Supports the creation and use of new more dynamic, integrated formats for representing data, information and knowledge,
3. Can support new forms of group collaboration in the creation and use of information; new communities of practice,
4. Enables customization and personalization of information, including assistance with management of information overload (11).

Digital library is human activity systems that unite readers, authors, librarians and researchers with electronic materials, resource streams, computer equipment and know-how (1). Rather than looking at the digital library as a specific technology, we are interested in placing it in the context of a specific learning and teaching environment.

The whole range of initiatives currently indicated by the term digital libraries. The digital library is an often-global organization of scientists or scholars who use advanced technology to create and share information over the network. This information can be related to research outcomes, but might also consist of source materials, survey data or data from ongoing research (9).

Characteristics
The documents or resources in the digital collection will be of very varied nature, as indeed are physical documents. A digital library collection, which may be logically defined as a set of criteria for selecting resources from a broader information space, may be less formally understood as a set of digital objects, with the following characteristics:

1. Unique: they should be identifiable as the same resource in whatever format or medium they are instated,
2. Coherent: they must present a logically coherent quantity of information.
3. Significant: they must include viable and useful information content.
4. Control: the objects are prepared and organized according to some standards, and are preserved in some way.
5. Access: they must be accessible by the libraries' systems (1).

The database of chaotic models includes digital unique objects, characterized by the coherence and significance and providing access via network.

Authors store their work in a database, which can be accessed over the network by everyone in the same field. Efforts are now being made to group similar initiatives (also known under the name open archives) in a consortium to achieve a universal service in the area of scientific communication (9).

A library's holdings will be defined by access, not by possession. Much of the library's material are delivered in electronic form, or printed on demand. There are however, some inherently electronic objects that cannot be examined except through computer and networks. Furthermore in our case, scientists are interested not only for the final definite form but also in the dynamical formation, in the

way fractals and chaotic models are formed. So, the electronic preservation is the only format or medium, which can depict the continuing formation of models and the digital library the only mode of their retrievable organization.

Collection

Although a major aspect of the digital library is its ability to provide access to material across networks, there will still be an identifiable "collection" available to patrons of that library. In other words, digital libraries contain discrete, identifiable and relatively permanent, information artifacts. These documents will be varied in nature, but will certainly include items analogous to printed books and journals. Different commentators view the extent to which a digital library encompasses other forms of material very differently. Other items will take the form of datasets of various kinds - geographical, environmental, scientific, statistical, etc (1).

So, there is an immense variety in the way expression in information sources has been shaped. Not simply in terms of intellectual structure, but also in the kind of expressive medium used; that is, whether the expression is textual and discursive, textual and elliptical, numeric, graphic, composed in a special language such as mathematical or chemical notation and the like. Indeed, some information sources may be distinctive by appearing to be combinations of many of these motifs or by appearing to be chaotic in their conception and execution, at least in terms of some standard of expression (8).

There will be a continued emphasis on text in digital libraries. Although digital libraries will provide access mainly to textual information, they will still have a predominance of multimedia products of various forms. This seems to generally agree, except for specific application areas, e.g. geographical information systems, or genome databases, where text will be a minor part (1).

The digital library model is no longer based on the traditional information chain, but on a network of researchers who create and distribute knowledge in the form of information objects. They include text corpora, data collections, audio-visual materials, simulations, embedded software applications, etc.

These technologies are the concept of multilateral documents, which adds useful functionality to document content, that is a new concept of scientific communication. And that's exactly what we seek for this collection, which among others gives the opportunity to researchers to observe the evolutionary formation of every model, an important achievement to this scientific discipline.

Material technical organization

A digital library will include an equivalent of the traditional catalogue. Though it will require a richer set of metadata descriptors and standards for dealing with the variety of information artifacts to identify (1).

It is not up to librarians to produce knowledge in most cases. The distinctive role of libraries is to organize the information have been produced and to facilitate access to it. In other words, concerning digital environment, librarians could plan and design electronic publications, design and operate electronic networks, organize electronic information files, devise and implement new types of information services and keep clients aware of newly available information sources (12). We therefore need to focus on knowledge and learning rather than purely on information, we must make sure that libraries support learners in finding the information they seek (5).

Bibliographic control is truly an area that needs serious rethinking. In a digital library environment where digital artifacts co-exist, librarians must go beyond generalized tools such as subject headings and classification to streamline access to the world of networked information. New organizational tools must be devised in order to describe the intellectual contents of digital library materials and establish links between them (11). Then digital artifacts could be enjoined with other tools to establish intellectual connections between artifacts and organize networked information into logical structures.

Perhaps, the greatest uncertainty, from the perspective of cataloging, is just what the new digital materials will be. Our current order carves up the bibliographic universe into (relatively) discrete, stable and long-lived units. But now, there is the potential at least for a great deal more variability and mutability of materials, and for a less rigid boundary between items. New genres, new categories of

description, new institutions and practices have not yet arisen to stabilize this material. All of this together would constitute a new order, or substantial changes to the old order, as yet unrealized (6).

The digital library of chaotic models is going to include not only the models of the researchers who participate but also some other chaotic models, basic and fundamental ones, invented in the past, after permission of the researchers or authors. The information that the present database includes and can be retrieved, is the following:

1. An alpharithmentic code, which represents the model and replaces the title.
2. The authorship.
3. The characterization of the model: deterministic, chaotic or biological, chemical etc. This categorization constitutes the subject analysis of the database. It is proposed a hierarchy to be established, such as simple /complex or general/ special. The reason is that the most of these models are related to each other and some models originate from others. Moreover, this is the evolutionary procedure of scientific investigation.
4. If the model is already published, the title, the publisher, the imprint of publication.
5. The time and place of the model' s invention.
6. The Organization, whom the author works for.
7. Size in bytes.
8. The time needed for the model to be completed on the screen.
9. Appropriate technology, interfaces etc.
10. Description of the model's form.
11. An abstract of the scientific documentation, the interpretation and the equations.
12. Keywords.

The software provides the browser and search selection. Search can be performed by authorship, title, keyword, free text, subject descriptors. The browser provides the classification schedule of the models. Under each descriptor, there is a list of the titles of the models associated with this term. By choosing a title, one can receive information about the model, while the choice "show" permits the gradual formation of the model. Although subject links between models need to be examined in more detail, that is impossible up to the moment. Copyright protection is taken into consideration and only authorized users can access to some fields of the unpublished models.

Users and the circulation of knowledge

The work practices described by scientists are heavily influenced by a concern for getting credit for findings and verifying that their findings were original. In their interviews, they described high stakes in terms of obtaining competitive funding, raises and promotion based on priority of discovery. Therefore they expressed a sense of urgency in terms of creating, finding, and utilizing materials in a timely manner. Like molecular biologists, computer scientist's work required them to keep up with very current materials. However, priority of discovery was less of an issue for them because there were several possible solutions and implementations for the same problem. Note how inter-organizational aspects for their research projects influenced their work practices (2).

Attempting to meet similar user needs, the organization of the chaotic models in a single digital library offers researchers a basin where they could find work that interests them and a start point for communication.

The concept of interoperability reflects, in outline, the need that information in disparate formats and media to be accessible by users through, as far as it is sensible and appropriate, a common interface, with a single authentication stage.

Digital Library users are considered as information -seekers with clear goals and competent skill to interact with archival databases. They insist in decreasing barriers to access and increasing speed of research publication even to expensive scientific data. Using DLs help researchers transcend time and place limitation (3).

Ethnographic studies of actual workplaces reveal the diverse mix of materials, digital and otherwise, commonly in use and offer no suggestion that this diversity is diminishing. By hewing to an agenda enlivened by this faith, I believe we are missing some important research opportunities, such as integrating heterogeneous (digital and non-digital) collections and providing tools to organize and search them (7).

Libraries, digital or otherwise, carry a strong symbolic charge. On the face of it, they are just one element in the larger circuit through which information travels from production to ultimate consumption. In this respect, they are on a par with the other elements in the circuit: authors, publishers, distributors, and communities of users. But libraries have come to symbolize, and to exemplify the values we impute to, the entire circuit. What we say about digital libraries and how we understand them embodies and signals out attitude toward the place of information in our culture. To this extent, it is potentially of great consequence not only how we construct digital libraries but also how we talk about them, and whom we include in the conversation (7).

Organizational changes

The argument to be put forward is that the real issue is not the transformation of print-based libraries towards new models of digital service provision, but a change in responsibilities for scientific communication, resulting in an important transformation of institutional roles in the information domain, including the role of the library. The information chain model identifies specific roles, such as knowledge creation, publishing, archiving, intermediation and use and actors that perform these roles, such as researchers or research institutes, publishers, libraries and users (9).

What is interesting is that it not only defines roles, actors and functions, but also implicitly defines responsibilities. In practice, academic institutions regard only knowledge creation as their responsibility. Publishers take on the responsibility for creating information products that serve as a vehicle for knowledge distribution, and libraries are responsible for archiving and availability of information products. There is no overall responsibility for scientific communication, held by a single actor. One might expect academic institutions to bear that responsibility, but until now that has not been the case (9).

Libraries by the occasion of the digital libraries development and because of them could develop the large body of initiatives aimed at self-publishing by academics and academic institutions.

Most, if not all, libraries will remain indefinitely in a "hybrid" state, with digital and non- digital resources offered side- by - side. These conflicting assumptions are freely offered as alternatives in the literature. The first is favored, in general by those working with scientific, technical and commercial materials, especially those from a computing background, and those involved in "leading edge" research; the second by those involved with research –based collections, especially in the humanities, those from a librarianship background, and those involved in service development. Espousing one or other of these assumptions is equivalent to a belief in the digital library and the hybrid library model respectively (1).

Implementation of the digital library concept implies organization and cultural change. While this seems to be agreed by all writers who mention it, which is an increasing number, there is some difference in emphasis as to whether this change affects primarily library/ information professionals, users, or the whole environment including all the players. Those commentators who devote most careful thought to this issue seem to generally favor the latter option (1).

Conclusion

Eventually, printed information will become more or less invisible because most users will regard the network as there one and only source of information. This is a practice, which already is becoming visible in the information behavior of many students, and even researchers (9). Direct communication between authors and uses is actually not a recent invention: it has always been possible to "bypass" the publisher. The methods - electronic mail, desktop publishing, remote bulletin boards, and so on- are new, but the relation is not (4).

Although these various forms of self-publishing by the academic community do not constitute a fundamental change in the information chain, they could develop procedures that might be crucial for the future of scientific communication, the information chain and the actors involved. That development is the increasing tendency of the academic world to take on responsibility for the entire process of scientific communication, rather than leaving the responsibility for specific and important functions to other actors (9). For these reasons, we invite every interested organization to join us for the further development, evolution and expansion of this digital library, in any way.

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THE ACADEMIC LIBRARY IN THE 21ST CENTURY – WHAT NEED FOR A PHYSICAL PLACE?

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Introduction

Universities in Australia are facing significant challenges. Government funding is contracting, globalisation of higher education is increasing, and universities face competition from not only other traditional institutions but also commercial entities which have entered the higher education arena. Advances in technology have enabled the emergence of virtual institutions which have no physical boundaries or constraints, and the development of online teaching makes the location of students increasingly irrelevant. The student market and their needs have also changed. Life-long learning, mature age learners and part-time participation are now significant factors which must be accommodated. Universities have responded with the development of off-shore campuses in strategic locations; forging alliances with other institutions, not restricted by national boundaries; carving of niche markets and actively promoting specialist courses; maximising opportunities presented by information technology; the adoption of new approaches such as problem based and student centred learning; and the provision of flexible and online delivery strategies for teaching and learning. In particular, the advances in technological capabilities and the resulting organizational adaptation to technological change by institutions, are likely to have significant effects on the academic library, its services and enabling physical facilities. [1]

Background

Three years ago, La Trobe University a multi-campus university located in Victoria, Australia undertook an investigation of trends in the planning and design of academic library facilities. This was in preparation for a number of library building projects which would alleviate severe space problems at three of the campus libraries. The proposed building projects comprised a major redesign and reconfiguration of the main services floor at the Bundoora campus library in metropolitan Melbourne; a new library for the Albury/Wodonga campus in north-eastern Victoria and an extension into existing non library space at the Bendigo campus located in central Victoria.

Information was collected through reviews of the literature and a series of site visits to libraries in the United States. [2] The key issues for academic libraries then, as now, included the need to reposition from custodian of locally held collections to the gateway to information beyond the library walls; accommodating the rapid growth of information resources in electronic form; the investment and increasing dependence on information technology as the enabler in the delivery of library and information services; the changing teaching and learning environment and the converging roles of libraries and information technology providers. The impact of these issues was reflected in the changing nature of physical place in evidence in the new and redesigned library buildings being constructed at that time.

This investigation resulted in the identification of some key features or requirements of buildings which would meet the changing needs of the academic library and its users in a rapidly evolving higher education environment. These design principles have informed the planning for the La Trobe University Library building projects and comprise

- Ensuring maximum flexibility to facilitate internal redesign as the needs of the user and technology change, and unanticipated demands arise. This includes floor loading capacity to enable the move

to open access compactus shelving if required, and the wiring and cabling of buildings to minimise impediments to the redesign of existing areas to meet new needs;

- Provision of different sorts of space for the range of activities and services which libraries will provide - single and group study, space for activities which require active help and assistance from library staff, service counters, self service areas which encourage independence, allow choice and meet the needs of the "now" generation, spaces for teaching/learning/training in information skills and literacy, space for effective use of information resources, appropriate space for library staff, space to house information resources in a variety of formats and their associated technology requirements, and space for less scholarly activities e.g. comfortable reading space;

- Zoning, differentiation and protection of each type of space for different interactions, noise levels, technology support and service support requirements. Providing a seamless linking for the user;

- Incorporation of the new space norms or standards in areas designated for both print and electronic access and group study. Increase in space for workstation equipment as electronic resources increase and clients spend longer periods at these workstations. Additional space for the technology support infrastructure.

To date, the Bundoora campus library project has been completed and architect plans have been produced for the Albury/Wodonga campus library, but the project still awaits final funding approval. The Bendigo project has advanced to the stage where the concept of a new library building has been included in the revised master plan for the campus.

Australian Academic Library Building – The Current State
Continued monitoring of emerging higher education trends, and the potential impact of these on academic library services and associated physical facilities is essential. There is often a lengthy and uncertain time frame for capital works programs and the final funding approval for building projects. Serious planning may begin many years before project funding is finally authorised and such approval can be based on needs and predictions which are several years old. In a rapidly changing environment this can lead to a mismatch between what is delivered and what is now required.

In May 2000, a survey of current academic library building activities in Australia was undertaken. The libraries were asked to identify current or planned building projects, the drivers of the projects (i.e. why they were being undertaken), assumptions about the future of academic libraries underlying the planning and what were seen as the key innovations in the new facility. The broad purpose of the survey was to identify any significant new trends which were emerging in the physical planning of academic libraries. Thirty-eight libraries were surveyed and 17 indicated that they were currently involved in significant building activity. Two New Zealand academic libraries also responded.

The Rationales
Much of the activity was in response to changing university directions, including the rationalisation and sometimes closure of campuses and relocation of academic activities to other sites. This reflects a continuing evolution of the Australian higher education system since the massive restructuring in the late 1980s which saw amalgamation of institutions and establishment of multiple campuses of varying size and geographic dispersion. Nine institutions were extending their library buildings, as a consequence of both institutional consolidation and/or recognition that current library space was inadequate for both library users and collections. Seven institutions were planning or constructing new library buildings for newly established campuses (some offshore) or campuses where, again, libraries were considered inadequate in terms of sufficient space. Six libraries were undertaking projects which involved major reconfiguration of existing space to meet both changing library user behaviour and needs, and the shifting balance of library collections from print to electronic.

Other reasons included the need to achieve staffing efficiencies and reduced operating costs, improving workflow and functional layouts, and providing accommodation for new services and facilities to support changing university strategic directions, such as off-shore and off-campus teaching, and flexible learning initiatives.

The Academic Library of the Future – Underlying Assumptions

The survey respondents indicated a number of common assumptions about the academic library of the future which influenced their planning. These included

- print resources will still be required for the foreseeable future; access to networked electronic resources will increase. The balance between formats will vary with discipline areas. More rather than less space will be required for electronic access;
- there will be continued reliance on accessing and using information on campus, as well as from home and the workplace. Some clients will utilise their own equipment in the library e.g. laptops;
- independence of clients and demands for self-service facilities will increase, but they will need assistance in sifting through the range of options presented in the building. The concept of the one-stop shop for electronic resources, tools and assistance will increase in importance;
- a physical environment which is both psychologically supportive, aesthetically pleasing and safe will be important;
- clients will continue to study and learn in a variety of ways as the emphasis on flexible and resource based learning increases. Work for assessment will often be collaboratively undertaken and be presented in a variety of formats. This has implications for the types of study space and range of equipment clients will require;
- clients will demand longer hours of opening and 24 hour access to computing facilities as flexible learning opportunities increase;
- electronic and information literacy and the role of library staff in teaching information searching skills will increase in importance and require electronic training facilities;
- equity issues will demand accessible and specialist facilities for clients with a disability.

Respondents also consistently identified the requirement to ensure that the building was sufficiently flexible to accommodate future and uncertain change, as the access and use of information resources change, and different technologies are adopted and utilised in the transforming teaching and learning environment. Significantly, none of the responses questioned the continuing need for physical space or foreshadowed any decrease in size of that space in the future.

The Innovations

These underlying assumptions shaped the key innovations in the various building programs. A number of survey replies noted that the new features were in response to specific needs identified from surveys of client groups. Some developments also reflected attempts to capitalise on the potential synergies presented by organisational restructuring and realignments, particularly between library, computing, teaching and learning and other academic support facilities.

Specific features identified in the survey responses included

- 24 hour access to computer laboratories;
- physical isolation of specific areas to allow longer hours of access e.g. open reserve collection and adjacent computer, photocopying and study facilities;
- flexible learning spaces equipped with network access capability for group study and project work;
- workstations equipped for electronic information access including multimedia resources, and applications software such as word processing. Specialist assistance close at hand;
- production facilities for use by clients to develop their own audiovisual and multimedia resources in a variety of formats;
- videoconferencing facilities for client use;
- facilities to support client participation in networked online discussion groups;
- laptop docking facilities, wireless laptops available for loan;
- specialised facilities for researchers such as fully equipped workstations supporting information access and retrieval with full word processing and printing facilities adjacent to specialist assistance from reference librarians;
- special study domain for postgraduate students;
- open access compactus shelving
- provision of adjacent refreshment facilities or cafes including internet/cyber cafes;

- increased provision of self help facilities such as open reserve;
- teleconferencing facilities for administrative purposes;
- co-location of service desks for increased staffing efficiencies; and
- increased physical integration with related units in the organisational structure such as information technology, student support, and teaching and learning.

The Overseas Perspective

The survey was supplemented by information on current academic library planning and construction programs obtained from university and college websites, primarily in North America, and responses to questions posted to a number of online discussion groups. Features of these building programs highlighted as being innovative or distinctive were similar to those identified by the Australian and New Zealand academic libraries

- areas equipped with tele and videoconferencing facilities for distance teaching and learning;
- 24 hour computer and wired study facilities for laptop computers to enable flexible learning;
- increased emphasis on the social/leisure potential of academic libraries with the addition of gallery/exhibition areas and coffee bars or cafes;
- development of "information commons" facilities;
- co-location of the library facility with related units such as multimedia development and production services, information technology, centres for teaching and learning and academic support; and
- an integrated learning environment which combines or integrates traditional library services with other learning and support services such as multimedia production laboratories, information technology support, language laboratories, study skills support, and careers services (see, for example, Banks [3]).

The Challenges

The survey also canvassed comments from respondents on the challenges they faced in negotiating support for new facilities. Some reported funding constraints and pressures from competing interests limited full implementation of the original concept. One respondent stated that there still remained strong support for a traditional library as an integral part of the student experience, in line with the institutional strategy of providing quality on-campus education, rather than seeing the future as a virtual experience. A number commented on the value of client surveys to provide additional justification for new proposals. Unexpectedly, there was little comment on any increasing perception by university administrators that need for library space and facilities was on the decline, with the rapid growth and uptake of networked electronic resources. This may be because the survey respondents had already achieved success in obtaining support and funding for projects. Nevertheless it is seen by many in the current literature as the next great library debate.

The emergence of virtual degree granting institutions in North America compelled the Association of College and Research Libraries to issue a position paper recently on the continued need for academic libraries. [4] The paper considered the question "does a degree granting institution of higher education need a physical library and librarians for accreditation?" The Association mounts strong arguments against reliance only on digital information, stating this is not equivalent to access to an adequately supported academic library. With the move to independent learning, the Association contends that it is even more important that professional staff are available to provide guidance in the use and evaluation of information. That the ACRL believed there was sufficient cause to mount such a case, is compelling evidence that arguments for the continued need for physical space must be well informed, defensible and attuned to the current and evolving needs of the academic library's constituents.

Crawford [5] maintains that libraries will, in fact, need more space in the future – space for growing collections, meetings, study, research and reading. However, he contends that funding for needed library expansion and renovation is already being denied in some colleges and universities because administrators are convinced that stacks and associated space won't be needed in a few years. These sentiments are echoed by Baughman and Kieltyka. [6] Concerned that some administrators consider the library is a "costly anachronism", the authors conducted a study of American colleges which clearly demonstrated that strong library collections were correlated with higher scholarly productivity, and higher institutional ranking. Rettig [7] argues that the academic library as a place will persist in

importance because of the economic sense in co-locating locally held print and electronic resources, and the very considerable investment in the technically advanced equipment required to access them (and remote electronic resources).

Nevertheless there has been a decline in constructions, expansions and renovations over the last seven years, at least in the United States. The 1999 Library Journal survey of library building projects noted that the number of academic library construction projects had again decreased with a total of just 30 completions. [8] This continues a decline which, in 1994, was thought to indicate a crisis in academic library building. [9] In that year 38 projects were completed. Other current trends, which should be monitored and may impact on arguments for further expenditure on expansion or redesign of library facilities, are the reports now emerging of reduced usage of buildings. [10] Some libraries are also reporting a reduction in the borrowing of physical materials. [11] Both of these trends may be a consequence of increased remote access not only to the Internet and library catalogue, but increasingly to licensed databases. However they may also be the outcome of changing user needs and an increasing mismatch between the facilities (and services) that users now require and those currently being provided by the library.

Future Models?

Kaser [12] documents the evolution of the American academic library building into four architectural stages, speculating that such buildings "have not yet realised the impact of new electronic technologies" and a fifth type may yet emerge. Conversely he also poses the possibility that contemporary modular library design, where books and reader spaces are integrated, may be continue to serve effectively in an electronic environment. Certainly the evidence of the current surveys indicates that services, functions and associated physical facilities are undergoing substantial albeit gradual and evolving change in response to the changing higher education environment, and repositioning and restructuring of parent institutions. The new library may be more of a workshop or laboratory than a warehouse, where students and researchers will integrate information from a wide range of media types into new forms and formats. [13] This behaviour is likened to the changing approach to retrieval of information, where hypertext links now provide access to content from many directions, moving beyond the traditional linear model of searching which has evolved in a primarily print based environment. The implications of this for building design have not been fully explored and there is need for more focussed user behaviour studies to investigate the new ways of information seeking, selection and use and how these might be better facilitated by the design and equipping of the physical space. Currently observations and assumptions are the primary guides available.

Information Commons

"Information Commons" are now appearing in many major academic libraries in North America. The terminology though perhaps not the concept, is less familiar in other countries. Certainly some elements are featuring in new library developments in Australia and New Zealand. This is "a new type of physical facility specifically designed to organise workspace and service delivery around an integrated digital environment." [14] Information Commons are characterised by individual and collaborative computer workstation areas which provide access to a wide range of software tools, not just information resources, ready access to assistance from staff with a range of specialist skills (computer, reference and media) providing a continuum of service, and individual and group work spaces with close physical access to the specialist assistance and the technology. The model encourages a holistic one stop shop concept to student and staff research, enabling information access, retrieval, and integration of material into a new whole to be undertaken at the one point. The Information Commons facility in the Leavey Library at the University of Southern California was, in 1994, one of the earliest and most publicised attempts to incorporate this new type of space and service to meet changing needs in a digital environment. The Commons experienced such high usage that it was doubled in size towards the end of 1998. Many other North American institutions have since adopted this model with similar successes e.g. Halbert. [15]

Increased access to computer facilities across campus and in the home may raise the argument that there will be a decreased need for this type of facility. However it must be recognised that digital information resources will not meet all information needs. Much important and needed information will remain in printed format for many years to come. The user should be provided with the opportunity to move from digital to print as seamlessly as possible. The provision of expert assistance at point of need is also an

important principle of this service. The social role of such a place also needs to be recognised. "The value of social sharing (of ideas, information, problems and dreams) that results from working and talking in groups should not be underestimated. People need to talk to each other when they move away from their computers, for it is this personal interaction that ultimately and uniquely enriches and humanises the learning experience." [16]

Leighton and Weber [17] describe the following two models as embodying the merger of academic libraries with related learning facilities to form what they call the "meta-library", resulting in a physical place which goes well beyond the traditional library, both in concept, educational function and services delivered.

The Integrated Facility
This model represents a shift from a focus primarily on the library needs, with reasonable incorporation of computer based technology, to one where the technology is given a more dominant role, shaping a new instructional environment. The integrated facility encompasses both the provision of and access to information, acknowledging not only the continuing significance of print material but also the increasing importance of an information technology rich environment. The result is a new amalgam of functions and spaces which brings together information resources, technology, production facilities and the combined talents of information professionals from across the campus. The technologies and library functions are often so integrated into this collaborative environment, that where one ends and the other begins cannot be easily be determined.

The Learning Centre
The learning centre focuses on the melding of curriculum support and student culture – gathering all the components under one roof so that students are provided with a total university experience, through interaction with books, technology, peers, and academic teachers and support. Academic studies are linked with other educationally purposeful activities in a seamless intellectual and social space.

The Decentralised Model
This academic library of the future focuses on distributed access to services. [18] In this model, the library continues to move beyond its walls. Fewer services are centrally sourced, with satellite functions, such mini information laboratories, located outside the library. This model of the future will be organised in some ways like those of the past, where branch library collections and associated services existed outside a central library. The new decentralised model, enabled by technology, allows services and expertise to be once again distributed and relocated closer to the users, in their offices and laboratories.

Conclusion
Whatever the model, it will probably be primarily driven by the educational objectives of the parent institution and its organisational structure and culture. The challenge for academic libraries will be to keep attuned to the strategic directions of their organisation as these are rationalised and refocussed, and be prepared for consequential new demands. It will be equally important to maintain an awareness of the changing behavoiurs, needs and demands of increasingly heterogeneous and perhaps more vocal client groups, and to rapidly re-align services and associated facilities to meet these new demands. The academic library has a unique capacity to provide an intellectual and social space on campus. A place where people can meet, interact and discuss in groups, both physical and virtual, in aesthetically pleasing and well equipped surroundings. A place which people enjoy coming to and a place where a range of specialist expertise is on hand to guide enquirers through complex information environments in their quest to discover new information and create new knowledge. As a recent OECD Experts Meeting on Libraries and Resource Centres for Tertiary Education 19 concluded, the academic library will continue to provide a "visible, identifiable and physical image" for the parent institution and remain an important marketing tool in the attraction of students, teachers and researchers, and an important contributor to the university's overall competitive edge.

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IATUL

NAVIGATING THE INFORMATION SOCIETY

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Introduction

I would like to begin by thanking the Conference Organising Committee and its Chair, Gaynor Austen for the invitation to be here with you for the Conference. I am honoured to be with you, not only as a speaker but as a peer member of the international technological university community, and a little closer to home, as a member of what is known in this country as the Australian Technology Network or ATN. Based on the five technological universities in Australia, this network is in the early stages of development. It has already made some significant achievements one of which is familiar to you through my colleague, Dr Alan Bundy, who spoke about an ATN initiative in information literacy at the last IATUL Annual Conference. Another achievement is the establishment of ATN WEXDEV, a program designed to provide networking and development opportunities for women in the ATN universities.

In my experience the leaders of university libraries are particularly capable in two areas. One is locating the best restaurants in town, those with not only the best regional menus but also the most reliable diverse wine lists. I'm sure you will sample the evidence of their collective taste and nose over the next few days. The other is planning on a grand scale. I ask myself: what other group of people would be able to hold their 21st Annual Conference so close to the beginning of the 21st Century and be able to signify coming-of-age on so many different levels?

This coincidence highlights the magnitude of the Conference theme, Virtual Libraries: Virtual Communities and the theme for today Unlocking Our Potential in the Knowledge Economy. Implicit in the timing is an opportunity to apply our accumulated experience and expertise to the new challenges and emerging issues that feature in the information ecology that I invite you to navigate with me. I also invite you to chart your own maps and images of this ecology during and following the Conference in light of the circumstances of your own locality and locale. In your discussions with colleagues and your reflections on the Conference I urge you to keep in mind one of IATUL's key Statutes: the purpose of IATUL shall be to promote effective co-operation among its member university libraries.

A cautionary tale

Before we begin our journey I would like to tell you a little about a book that I finished reading earlier this year. It caught my imagination and still lingers in my mind. Set about one hundred years ago, it tells the story of the deadly hurricane that almost destroyed Galveston on the coast of Texas in the worst natural disaster ever to hit the United States. With wind gusts estimated at 200 miles per hour and the power of a sea that at one stage rose four feet in four seconds, the loss of life was appalling in its magnitude and the damage inestimable. Yet this occurred at a time when the US Weather Bureau had the finest forecasting technologies available.

There are of course different layers to the story. One concerns the personal rivalry between Isaac Cline, the Chief of the Galveston weather station and the instigator of the first Texas-wide weather service, and his brother Joseph who was posted to the Galveston weather station just after Isaac had taken up his position there. Another concerns the deteriorating relationship between the US Weather Bureau and meteorologists in Cuba, marked by turf wars among professional forecasters and experienced weather watchers and overlaid with the ignorance behind 'white weatherman's burden'. Not long before the hurricane hit, the US Weather Bureau cut itself off from the warnings given by the very people who had pioneered the prediction of hurricanes. Of particular relevance to this Conference is the layer of the story

that hinges on the technologies associated with weather forecasting. The confidence placed in the technologies and the reputation of the US Weather Bureau was so great that some of the natural signs of the impending hurricane were overlooked - the brick-red sky, an inundation of frogs, unseasonal winds and temperatures, unusual tides. What haunts me about the story, *Isaac's storm* is the misplaced faith in the technologies along with the disregard of experience and expertise. As we move further into a technology-based world we would be silly not to heed these warnings.

Australia as an information society

Whatever we call this present period in the developed world we can be sure that its terrain is more complex than any of the catchy labels would have us believe. Information Age, Digital Economy, Information Revolution, Network Society, Knowledge Economy, Wired Society, Post-Capitalist Society, Connected Society, Information Economy, are terms that tend to be used interchangeably. Rather than discuss the significance of each one, I will use the term 'information society'. What I would like to do is to explore the idea of an information society from different perspectives and then look at the idea through the lens of information. From that point I want to raise a number of issues that are relevant to university libraries and then offer a way forward to some future developments.

Overseas delegates might be interested in a thumbnail sketch of the information society in Australia. This sketch begs the question of how an information society might be identified but I have chosen a few statistics as indicators of recognition of the significance of information to business, industry and education. Your discussions with colleagues and the papers you hear during this week will add substance and balance to the bare outline that I give you. The first set of figures has been sourced from the National Office for the Information Economy (NOIE), the second from the Australian Bureau of Statistics (ABS).

The NOIE now that releases a quarterly statistical report designed to show the readiness of Australians to participate in the information economy, the intensity of economic activity being undertaken on the Internet and the impact this activity is having on Australia. I have drawn on the report released in April 2000.

Readiness

- More than 6 million adult Australians were accessing the Internet at November 1999, an increase of more than 100% since February 1998. At the same time nearly 1.8 million households (25%) were connected to the Internet.
- Younger Australian adults and families with children that are characterised by high incomes and reside in capital cities are leading the way in the adoption of the Internet.
- Large Australian businesses have nearly reached the saturation point in terms of Internet adoption and are nearing saturation point in home pages.
- Australian small business shows much lower level of connection to the Internet at 48% compared to medium size firms at 82%.

Intensity

- More than 75% of adults accessing the Internet at work or home did so once a week or more.
- 800,000 adult Australians had purchased or ordered goods over the Internet in the 12 months to November 1999. This was an increase of 183% over the previous year.
- 21% of SMEs connected to the Internet were engaged in Internet based sales and 22% were actively placing orders for goods and services at February 1999.
- Australia is a major driver of business to consumer commerce in the Asia-Pacific.

Impacts

- The primary benefits of e-commerce identified by SMEs were access to a much larger potential market, increase in the efficiency of business processes and a reduction in costs.
- SMEs' apprehensions with e-commerce centre on concerns about alienating their existing customers and technical issues arising out of lack of computer expertise.
- The NOIE has forecast a number of positive macro economic impacts for Australia as a result of the adoption of e-commerce.
- E-commerce has had, and will continue to have, a deflationary impact on many product and service

categories, which will positively impact on the economy as a whole.

The second set of figures from the ABS was included in a press release from the Australian Library and Information Association during Australian Library Week in May this year. Its focus is on the use of public and educational libraries. Last year, 800,000 Australians over the age of 15 years used the Internet at their public libraries. This represents an increase of 7.2% over the previous year. A further 1.2 million Australians used TAFE and other tertiary institutions to access the Internet, an increase of 20% over the previous year. Of those residents around Australia who were polled in the survey, 50% used their local public libraries. Libraries emerged as our second most popular cultural venue after cinemas.

Australian governments have shown an interest in the concept of an information society for almost a decade. Attempts to develop a policy framework began in 1991 with the House of Representatives Standing Committee's report, *Australia as an information society: Grasping new paradigms*. The purpose of the proposed National Information Policy was to 'promote discussion and understanding of the nature of an information society and to assist citizens, community groups, corporations and government itself to understand how information related changes can improve the quality of life'. Since that time and with changes of government, policy directions for information and communication technologies and the information economy have emerged but there is as yet no broad policy framework of the kind evident for example in the OECD and the United Kingdom.

The strategic framework for the information economy proposed by the current Australian government is intended to provide a social benefit. It is designed so that 'the lives, work and well-being of Australians are enriched, jobs are created, and the national wealth is enhanced, through the participation of all Australians in the growing information economy'. For the moment at least, e-commerce and the Internet are central to policy initiatives in Australia, as we have seen from the figures shown earlier. The attention of government is yet to be turned to consideration of the broader social and cultural implications of an information society. On this point Colin Steele, Australian National University Librarian and one of the Conference speakers has predicted serious consequences unless government commitment to infrastructure includes an approach to coordinated national information content initiatives. He suggests that we need 'a knowledge economy which is part of a wider learning society, in which public good information is available to all sections of society and cutting-edge research information is available to libraries'.

Perspectives on an information society

It is clear from this very brief and highly selective sketch of Australia that there are different ways of viewing an information society. By no means do the indicators I have used capture the richness of learning opportunities, the diversity of ways of working or the blurring of the media boundaries that are familiar to us through our own experience. One writer who reminds us of the complexity of an information society is Frank Webster who offers five different perspectives: technological, economic, occupational, spatial and cultural. Webster is skeptical of many of the claims made for the information society and I commend his rigorous analysis of the work of leading information theorists to you. I want to use his five perspectives to frame our exploration and the Conference theme.

1. Technological

This is now perhaps the most common perspective taken on an information society. After all, information and communication technologies are highly visible in daily living in the developed world. Technology enthusiasts provide regular copy in the popular media with people such as Bill Gates, Garry Jackson and Larry Ellison commanding attention not only for their companies' innovations but also for the scale of their wealth and influence. It is reasonably simple to track the number of computers, television sets, software packages, cellular phone transmission towers, satellite transmitters and so on that are produced, purchased and installed. Penetration rates can be calculated and take-up rates can be predicted. You may not be aware that Australians have a reputation as speedy adopters of technologies. I have read recently that Australia is in the top five countries with the most Internet users per capita. The most common explanations for this situation are that we suffer from the 'tyranny of distance' within the country and from our relative isolation from the rest of the world as an island continent at the bottom of the globe.

But how do we recognise an information society on this basis? How do we know when we're in it or even near it? And what does it mean? What does it tell us about ourselves? Some objections to this perspective point to the privileging of technology so that it comes to define and describe an entire social world as in the Age of the Computer or the Digital Age. Other objections point to the oversimplification of the processes of technology diffusion implicit in this approach and the misplaced focus on technology as the primary driver of social change. Some would have us believe that the technologies are a force for good and that our lives will be transformed if only we would adopt them, the sooner the better. Their sense of urgency is caught in this advertisement from a recent edition of Time:

> this is the surge economy where more business is condensed into seconds than used to get done in a day. and the only constant is change. in the surge economy, the only way to thrive is to be flexible. intel provides the technology....intel makes the technology that makes you ready for anything. because in the surge economy, long-term business plans aren't written in stone. they're e-mailed every Monday morning.

Our experience of information systems and information networks tells as that in themselves they are no guarantee that information is either accessible or available nor do they always yield the benefits that are promised.

2. Economic

This perspective on an information society has its origins in the work of Fritz Machlup who estimated that 29% of the GNP of the United States was generated by the so-called information industries in the early 1960's. These industries were categorised into five groups: education which included libraries as well as schools and colleges; media of communication which included advertising as well as radio and television; information machines which included musical instruments as well as computers; information services as in insurance and law; and other information-based fields such as research and development activities. Using a modification of Machlup's methodology, Porat demonstrated that by the mid 1970s the United States information sector had grown to 46% of GNP. Since that time though it seems that the growth of this sector of the US economy has not only slowed in comparison with other sectors of the economy but it has also not grown since 1970.

In Australia, there has been considerable interest in this perspective on an information society. Barry Jones established the emergence of an information society in his replication of Porat's study in the 1980s. As a member of the Labor government at the time, Jones was one of the driving forces for the development of a national information policy. Don Lamberton, an information economist, has contributed significantly to international scholarship in this field. He argues strongly for the development of a taxonomy that includes tacit knowledge as a basis for a more useful analysis of the economy, especially in relation to sustained innovation and growth.

In business and industry, economic approaches to information have been extended and applied to the firm and to organisations. Information resources and assets have been hailed as the keys to competitive success and knowledge has achieved prominence as a factor in the intellectual capital of the firm. Peter Drucker writes of a knowledge economy but concedes that the behaviour of knowledge as an economic resource is not yet fully understood. What is clear though is that knowledge is being applied to knowledge itself and that productivity is dependent on the development of new knowledge.

There are a couple of shortcomings evident in the economic perspective. Some commentators suggest that the term 'information economy' is so prominent now not because of the size of the information sector of the economy itself but because of the emergence of the new information technologies. The information economy has come to represent the complex of changes associated with the diffusion of information technology throughout the economy and society as a whole. Other commentators emphasise the need for a conceptual framework that will give knowledge and learning the central focus in the analysis of economic change. Nonetheless there still remains the fundamental question of the extent to which this perspective allows for considerations of the quality of information as well as for the processes of creation, production, distribution and use of information.

The same breathlessness in the announcements of new gee-whiz technologies can also infect

announcements about the information economy. This sample is from a book advocating a web-based approach to managing knowledge.

> The Information Age….is dead and gone, replaced by the information economy…. The Information Age was about the building of databases. It was about the rise of computing. Today, the databases are already built; the ninth generation of personal computers is already passing through the marketplace; computing has merged with communications to create connectivity…. [We have] passed into the information economy. In the information economy, intellectual capital, not physical assets, drives everything.

The image presented here ties together the themes of information technology, the economy and knowledge. These are some of the themes that will be explored in more detail during the Conference.

3. Occupational

This perspective on an information society is sometimes linked to economic measures as in the case of Porat's work but it refers primarily to the proportion of the workforce engaged in information work. In his seminal and extensively cited work *The coming of post-industrial society* Daniel Bell makes two claims about the conditions leading to an information society in the US. The first condition is a change from a goods producing to a service-oriented economy, the second is the growth of white-collar groups in occupational distribution. Although Bell is regarded as the foremost writer on the information society it is telling that he himself seems not to have embraced the term. In a carefully argued critique of Bell's body of work elaborated by personal correspondence, Duff draws attention to three inter-related themes that Bell advances. In addition to the post-industrial information workforce, Bell is concerned also with information flows and the revolution in information technology.

Drucker too writes about occupational groupings and the nature of work that defines post-capitalist society. He distinguishes between knowledge workers and service workers with a porous line between the two groupings. Knowledge workers are concerned with words and ideas, service workers with people and work. Because knowledge is the key economic resource, knowledge workers are the leading social group. Based mainly in organisations, the group encompasses knowledge executives, knowledge professionals and knowledge employees. These people have specialised knowledge and capabilities that they contribute to their organisations. Post-capitalist society is transformed by knowledge and so too are organisations and nations.

Obviously the size of the information workforce is dependent on definitions of information work. Broad groupings such as those used by Bell, Porat and Jones disguise the complexity and diversity information work and overlook the contributions of the different information occupations to the health and well-being of an information society. For example, Bell's grouping of professional and technical occupations includes engineers, natural and social scientists, teachers, medical and health personnel as well as a general category of accountants, clergy, lawyers, judges and librarians among others. While the relative size of occupational groupings is no doubt important to the fact of an information society, changes in the world of work and the workplace are also important to the social dimensions of an information society.

We have all experienced some of the changes in the world of work and their broader educational and social consequences. Inner-city areas are reclaimed as residential space by large numbers of knowledge workers, displacing factories and their employees in the process. Work hours are extended to accommodate broader work roles dependent on a resource that does not shut down with the flick of a master switch. Some workforces are reduced as people are replaced by information technologies capable of rapidly shifting large volumes of codified knowledge. Some industries are regenerated as sophisticated technologies enable reinterpretation of data. The impact of knowledge on work is a topic discussed in popular business magazines on sale at newsagents. These changes are captured in an advertisement that I clipped from a newspaper supplement a few months ago.

> Positions vacant: Team leader for exciting new e-business. Successful applicant should be disloyal, break rules, resent authority, ignore punctuality and flout dress codes. CBD, $150K + options. The new e-economy isn't just redefining the nature of business but it's completely

upending the qualities expected of the middle and senior executives who drive it. Shareholders who've tasted the multiples that pour from online now demand more than old style wealth maintenance – instead wealth creation. The kind provided by the shock troops of the hot desk world. The best of whom are a lore unto themselves…'

Behind the extravagant phrases are trends that we have seen played out over the past few years and the three themes that concerned Daniel Bell almost forty years ago. Missing from the advertisement though is any suggestion that not all of us want to, or are able to join the shock troops in their hot desk world.

4. Spatial

For Webster this perspective draws on the geographer's sense of space. It emphasises the information networks that connect locations and affect the organisation of time and space. The convergence of telecommunications and computing has enabled the development of networks that are characterised by an ever-increasing flow of information at increasingly high speeds. The perspective is captured in the image of an information infrastructure similar to an electricity grid or a highway and it has shaped a number of key government initiatives in some countries, most notably the United States. There are also initiatives aimed at the development of a global information infrastructure.

Central to the networks is their traffic or information flow. We have experienced the enormous increase in traffic on the networks that we use in our workplaces. Virus infection has taken on a new meaning and we use scanners to maintain the health of our networks. Organisations can respond more rapidly to their customers and suppliers and in the process develop new kinds of relationships with them. Educational institutions can respond more effectively to the learning needs of their students through their use of networks as communication tools and delivery mechanisms for personalised learning resources. Young people use ICQ and chat rooms as a communication medium of choice. The electronic networks are free of the time and space constraints of the physical landscape. Time and space take on different dimensions. This does not mean though that the networks always offer forms of communication that are suitable substitutes for face-to-face interactions.

As we have seen with the other perspectives so far there are some limitations inherent in the spatial perspective. The technology again assumes an importance that threatens to overshadow the flow of information as the essential element of the networks. If the volume of network traffic is a sign of an information society then where does that leave considerations of the quality and impact of the information that is stored, transmitted and retrieved by the networks? The significance of the answer to this question can be appreciated in two ways, the first through electronic library projects and the second a development in my home state of New South Wales. I assume that you have been involved in digital library initiatives in your own university libraries. I would ask you to reframe one of these as a networking project designed to connect the library with its users of electronic information resources and then to consider what is omitted when the initiative is conceptualised only as a networking project.

In New South Wales the development of nsw.net is much more than a networking project. That this is so is highlighted by the fact that the lead agency in this multi-million dollar government funded project is the State Library of New South Wales. Small and large country towns, provincial cities, suburbs and Sydney CBD are being connected through the public library network that is coordinated through the State Library. The opportunities that nsw.net will provide for community development in all areas of the State, especially those that are geographically isolated, are almost limitless. This is a project that has the potential to explore some of the technological, informational, social and economic dimensions of networking.

5. Cultural

The final perspective to be considered is the cultural. The information environment in which we live, work and play is laden with both media and meaning. The films we see, the television programs we watch and the books we read are shared with people in other parts of the world, mainly in the English speaking world. Style icons and fashion brands are recognisable on most continents. Young people the world over dance to the same music and videoclips. Culture shock seems to be a condition of travel in the past. I heard a radio interview with a Canadian visitor last week and he commented that he felt quite at home in Adelaide the minute he stepped off the plane. Perhaps that is an experience that our overseas

delegates have also shared in the past few days. The point of these examples is that not only have the informational dimensions of social and cultural artifacts been transferred world wide through the media but so too have the symbolic and meaning dimensions of those artifacts.

The cultural perspective throws into sharp relief an area of tension relevant to the Conference theme: the local and the global. At the local level, community groups quite reasonably expect to assert and strengthen their identities and nurture their heritage. At the same time we are part of a global community with opportunities through the networks to develop social ties irrespective of national, geographic or cultural barriers. Yet these very opportunities carry with them considerable potential for the development of an impoverished culture of a kind that denies the richness and traditions of our cultures and therefore our humanity. One commentator has in fact suggested that the success of the knowledge economy is dependent more on a cultural revolution than on information technology. At the core of the revolution is the development of capabilities for managing and using the vast quantities of information that are available to us so that we can continue to maintain a sense of identity and ensure it is recognised by others.

We have now surveyed the notion of an information society from five different perspectives, none of which is itself adequate to the task of describing an information society. It is impossible to attribute the development of an information society to either the spread of information technologies or to the increasing availability of information. In any event the economic, spatial and cultural perspectives reinforce the need to consider the contexts in which information and the technologies are applied and used. The five perspectives together highlight the complex nature of an information society and the communities that are an integral part of it. Whether or not we are an information society is perhaps a moot point. The fact of change in the information ecology is inescapable.

An approach to information

In our discussion so far we have not attended to the nature of information although we have made an implicit distinction between information and knowledge. This is not a problem in itself but it does become one when we want to assess the impact of information, say in the workplace, or we want to develop policies for access to it and strategies for improving the use of it. We need to know what it is that we mean by the term. The traditional hierarchy of data, information, knowledge and wisdom is useful to a degree but there remains general confusion surrounding the boundaries of each level in the hierarchy. The confusion is compounded by the degree of human information processing that has come to be associated with each level and by the different connotations ascribed to the terms in the hierarchy by different fields of professional practice. The word 'information' has come to be almost meaningless, a weasel word.

Given what I take to be the central place of information in an information society we need to attend to the meaning of the word in ways that are helpful to us. I would like to briefly outline an approach to information that is potentially useful in this context. I then want to overlay it on the five perspectives that we have explored as a way of identifying strengths and weaknesses in our thinking about information in an information society. We should then be in a position to identify some information-related issues that are relevant to universities. There are of course other approaches to information that will no doubt be explored during the Conference, especially in the papers directed towards knowledge management and supporting student learning.

The approach I want to outline here comes from Michael Buckland who is familiar to many of us through his work on academic and digital libraries. Buckland has based his approach on common usage of the word 'information' and what it is that is informative. He identifies three different kinds of information: information-as-thing, information-as-process and information-as-knowledge. Rather than a hierarchy based on differences among levels, this approach reinforces the commonality and relationships among the different kinds of information while at the same time acknowledging differences as well. For example, information-as-thing is tangible but information-as-process and information-as-knowledge are both intangible. Information-as-thing and information-as knowledge are both entities, but information-as-process is a process. This approach suggests that information and communication technologies (and information systems whether or not they are technology-based) deal directly with information-as-thing as well as with representations of knowledge in a tangible form.

Information-as-process is concerned with becoming informed and so with making meaning. Information-as-knowledge is 'personal, subjective and conceptual', or the meaning that is made as a result of becoming informed. It is these characteristics of information-as-knowledge that present some difficulties to the proponents of knowledge management who claim that knowledge can be managed.

We can place Buckland's categories of information over the five perspectives that we have explored according to the kind of information that is implied in each perspective. To a large extent this is a matter of judgement but the discussion about the alignment of different kinds of information with each perspective is one way to start clarifying our thinking. The table below illustrates the overlay of the perspectives with different kinds of information.

	Information-as-thing	Information-as-process	Information-as-knowledge
Technological	4		
Economic	4		
Occupational	4		
Spatial	4	4	
Cultural		4	4

Most of the perspectives focus on information-as-thing. Yet none is static. The technologies are continually evolving to provide access to information in different forms and to facilitate the sharing of tacit knowledge. Different approaches to economics are being developed in response to the emergence of information and knowledge as key factors in the global economy. New occupational groupings are emerging as people develop new capabilities. Traffic through the networks flows in changing patterns. Theorists are critiquing the culture of cyberspace and are engaging with the tensions between local and global issues.

A question that arises is: What markers are appropriate to chart the development of an information society in relation to information-as-process and information-as-knowledge? Already work in this area has begun. Alan Burton-Taylor for one has identified signs of what he sees as the knowledge-based economy. Its characteristics include an increasing use of symbolic goods, as in electronic banking and e-commerce, the demassification and distribution of physical resources as we have seen in distance learning and just-in-time information services and the boundaryless enterprise that spills over national and geographic borders. The fundamental and central importance of human creativity and intelligence in what is termed 'the weightless world' by Coyle resonates very much with the premium placed by Drucker and Burton-Taylor on knowledge as the key economic driver and resource in an information society. These approaches to information-as-knowledge have the potential to extend the spatial and cultural perspectives suggested by Webster rather than require the addition of new markers. If this is the case then we are on the path to an information society of a different order to that originally envisaged.

Information issues for universities

With their remit for the creation and transmission of knowledge universities have a unique role in an information society. Certainly the unprecedented pressures that have had an impact on many organisations have buffeted universities as well. In many instances they have responded imaginatively and created new opportunities for themselves. In my experience our universities have given lie to the saying that it is harder to change a university than move a cemetery. The goals of universities are still based on the creation and transmission of knowledge. What has changed is not the goals but the ways in which universities go about achieving them.

From an information point of view there are two particular issues for universities in an information society. Both are connected to the creation and transmission of knowledge, one related more to knowledge production, the other more to learning. Both reflect the sorts of changes that resonate with the five perspectives that we have discussed and both are concerned with information-as-process and information-as-knowledge. First of all I would like to consider new modes of knowledge production and then I would like to explore the implications of the free flow of information.

1. New modes of knowledge production

Among the best-known analyses of the changes in the way that knowledge is being produced is the

analysis presented by Michael Gibbons and his colleagues. Although Mode 2 is claimed to be a new form of knowledge production I would suggest that it is well known among the technological universities where there are already strong and productive links among these universities, business, industry and the professions. Some of the critics of the characterisation of two different modes of knowledge production argue that they have both always existed side by side and that what is new is a shift away from the dominant Mode 1. The two modes are summarised below in terms of the context of knowledge production, their disciplinary orientations, the organisational diversity required by each mode, accountability factors and finally quality control in each mode.

i. Context
Mode 1: Problems are set and solved in a context governed by the academic interests of a specific community.
Mode 2: Knowledge production is carried out in a context of continuous negotiation, for example with government, industry, society and so knowledge is socially distributed. Intellectual and social demands inform the context.

ii. Disciplinary orientation
Mode 1: Knowledge production is disciplinary.
Mode 2: Knowledge production is transdisciplinary and this is reflected in all phases from the evolution of a framework to guide problem solving through to the diffusion of the knowledge that is produced.

iii. Organisational diversity
Mode 1: The skills and experience that people bring to knowledge production are relatively homogenous and so too are the sites where knowledge is created.
Mode 2: The skills and experience brought to the problems are heterogeneous. The sites of knowledge creation are diverse and include research centres, government agencies, consultancies, as well as universities. Multiple sites are often linked in different ways through networks of communication. Research groups are not highly institutionalised and members reassemble in different combinations in different sites to work on new problems. The experience of members is transferred to new contexts. Patterns of funding are also diverse and the expectations of the funding providers enter into the context of knowledge production.

iv. Accountability
Mode 1: The discipline has traditionally been the source of accountability.
Mode 2: The knowledge production process is marked by social accountability and by reflexivity on the part of those involved.

v. Quality control
Mode 1: Quality is assured and control exercised through the peer review process.
Mode 2: There are additional criteria for determining quality applied through the context of knowledge production. Along with intellectual criteria are social, political, or economic criteria. The quality control process is broadly based.

There are aspects of an information society that demand Mode 2 research and knowledge production. Foremost among these is the need to know more about the social and cultural aspects of information technology. Pertinent here is the emerging field of social informatics, defined by one of its leaders, Rob Kling, as 'the interdisciplinary study of the design, uses and consequences of information technologies that takes into account their interaction with institutional and cultural contexts'. Perhaps it is this field that might inform research and scholarship, debates and action agendas of the kind that bring information-as-process and information-as-knowledge more sharply into the purview of the technological perspective.

Mode 2 knowledge production makes demands on universities while at the same time providing opportunities to engage with partners in new ways in the interests of longer-term collaborations. Among the demands are a commitment to strategic alliances, new and flexible ways of providing services and the provision of a fairly sophisticated technological infrastructure that will support networking and information exchange often as a replacement for face-to-face interaction. Consideration needs to be

given to intellectual property issues, staff development initiatives and ongoing evaluation of the benefit and value of partnerships that support socially distributed knowledge production. Of course there are emerging and changing roles for libraries in these collaborations with the prospect of partnerships not only with knowledge creators within the universities but also in the collaborating partners.

2. Free flow of information

This is an issue that goes well beyond the question of whether the Internet should be censored, a topic that deflects attention from the broader social, cultural and educational bases for the free flow of information. Fundamental to the free flow of information are considerations of access to information that can be regarded as occurring at three interconnected levels in an information society. Universities have a key role in knowledge transfer and the diffusion of information at each level: societal, institutional and individual.

At the societal level the free flow of information has implications for policy making by government. The Australian government's current strategy focus on the Internet and e-commerce must broaden soon so that the intended social benefits from government investment in infrastructure can be realised. This might be more a matter of policy and strategy coordination of the kind that is developing in the United Kingdom through the People's Network and the National Grid for Learning. In Australia policy coordination has been advocated by the Australian Vice-Chancellors Committee in its submission to the Information Economy Action Plan which is soon due for release. Copyright laws and lending rights legislation also have an impact on the free flow of information and are matters that reflect and are shaped by social attitudes towards information, its value and benefits.

The level of access to the flow of information and knowledge in a global society extends beyond national borders. Of real concern is the imbalance between the North and the South not only in terms of access to information but also in terms of relative contributions to the global stock of documented information and knowledge that is currently dominated by a few countries. The situation has been described in the following way: 'we have got rid of skin colour-based apartheid but are now facing the emergence of an information access-based apartheid'. The outcomes of the G8 Summit at the end of this month in Japan should provide some directions for creating the global information society and strategies for addressing the imbalance. Universities need to consider their response to any directions that emerge especially in light of our commitments to international students, many of will be returning to their own countries to practice in their chosen fields.

The second level of focus for the free flow of information is the institutional level. In an information society universities are key nodes in information and knowledge networks, both real and virtual. Their research and learning programs ensure that they play a dynamic role in those networks. The pattern of social distribution of knowledge creation is reflected increasingly in the transmission of knowledge through flexible-, distance- and work-based learning initiatives. You will have your own examples of changes in ways of working with academics, their students and their industry and community partners to exchange with each other. University libraries are no longer only service providers but are also becoming established as content providers and product developers. Librarians are developing roles in teaching and learning practice and well as information practice. There are parallels too in research programs, especially where research and information practices converge in the diffusion of innovation and scholarly communication.

There is another role for university libraries that is very much identified with information practice. As organisations and businesses, universities inevitably continue to assume the characteristics of knowledge-based enterprises. In this context, the expertise and experience of some librarians is extremely valuable to the management of universities. Librarians understand the difference between information and knowledge and they are able to work with a variety of formats. They understand concepts such as information need and information utilisation and they are skilled in packaging information. They understand the principles of organising information and indexing it for retrieval. They understand the design of information systems and speak the language of system developers. They are very well placed to make significant contributions to information and knowledge management at an institutional level.

- The third level to consider in relation to the free flow of information is the level of individual information users. A key concern here is informational poverty, a concept developed about fifteen years ago but becoming increasingly relevant. It refers to a shortage of needed information that arises from lack of access to it or an inability to find it and use it. The concept is a useful one in an information society because it reinforces the need to have available information that is reliable, useful and significant to its users. It also highlights the social benefit and value of information. Paradoxically, informational poverty encompasses information overload. Some of the solutions for minimising informational poverty include the development of filtering mechanisms, ensuring the capabilities of information intermediaries, more effective information control and management and the development of more effective information services. An additional solution lies in widespread understanding and acceptance of the role of information in the evolution of human society. In this sense informational poverty is relevant to all three levels of access to the flow of information that I have identified.

Informational poverty can be addressed also through education and especially through information literacy programs designed with academics. But I would suggest that the concept of information literacy needs review in light of our changing knowledge ecology. The models of information literacy that have been applied so far reflect the traditions and assumptions of Mode 1 knowledge creation and diffusion. Newer models need to be informed also by developments in learning, such as situated and collaborative learning, as well as by the emerging technologies and new means of communication. Information literacy more clearly needs to address the needs of personal information management to support lifelong learning.

These three levels of access to information flow are not mutually exclusive. The resolution of issues at one level can have an impact at another level. For example, the development of protocols for electronic document delivery among libraries can enhance the flow of information to individual information users and the cooperative digitisation of key collections in libraries can enhance remote access by individuals to these collections. Universities and their libraries have significant roles at all three levels because of their positions and credibility, their experience and expertise. They are very effective advocates for the development of technologies and networks that support learning and knowledge creation and for the development of an information society that is equitable.

Where to from here?

We have covered a lot of territory and along the way we have highlighted areas of promise and potential as well as gaps and issues to be resolved. We have also glimpsed some opportunities for universities to assert their rightful place in an information society and to ensure their ongoing contributions to a knowledge-based economy. There is one final thought that I would like to leave with you. Chris Duke, the Deputy Vice-Chancellor of the University of Western Sydney cautions us not to be 'dazzled by the sunrise of the virtual universe low over the eastern horizon and blinded to the way ahead – the road beneath our feet'. He argues that the new regionalism created alongside the global economy is yet to be fully understood and grasped by universities who can play a central role in developing learning cities and regions. I want to share with you a quote from an OECD report that Duke refers to in his article. It very neatly draws together many of the paths we have followed this morning.

Given the highly social nature of learning and innovation, it should come as no surprise that these processes often work best when the partners involved are close enough to one another to allow frequent interaction and easy, effective exchange of information. Indeed a credible and growing body of work emerging from disciplines as diverse as geography, industrial economics, political science, sociology and management studies attests that innovation is fundamentally a geographic process that is facilitated, but not necessarily contained, by spatial clustering of the involved parties within the same region. Proximity is invaluable, along with a shared regional culture as a basis for the social learning which underpins innovation.

Here then lies a very feasible pathway for continuing to redress the dominance of the technological and economic perspectives on an information society and to ensure that the benefits flow to us all. And if we return to the story of *Isaac's storm* that I referred to at the start of this talk I feel confident that there will be sufficient warning of a hurricane of the ferocity of the one that devastated Galveston and its community. I hope that you are too.

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Certification
I certify that this paper is an original contribution and that it has not been copied from or published elsewhere.

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IATUL

Education for a sustainable future

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ABSTRACT

The standard model of education implicitly assumes there is a body of knowledge to be absorbed and a set of skills to be developed. While these are necessary components of education, they are no longer sufficient. The rapid advance of understanding means that it is no longer possible to equip those being educated with the knowledge and skills they will need in their professional lives, because much of that knowledge and many of those skills do not yet exist. Education programmes must explicitly recognise that they are only steps in a process of life-long learning. Formal education must understand that we now live in a global world and incorporate an international emphasis. It should also recognise that the future is something we are creating rather than somewhere we are going, so all professionals should be educated to play a positive role in developing the future. Finally, it should be based on a recognition that much of today's lifestyle is not sustainable, so radical change is needed if we are to develop a sustainable future. These requirements impose stringent new conditions on both the content and process of education.

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IATUL

"VALUE NOT VIRTUAL – ONE LIBRARY'S RESPONSE TO THE VIRTUAL CAMPUS"

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Deakin University – in context

Deakin University was created in 1977, as a regional Victorian university based in Geelong, and it has been serving off-campus students since its inception. Today, it has six campuses: three in Melbourne, two in Geelong, and one in Warrnambool. There is 350 km between the furthest campuses and it still retains its regional roots despite the strong presence in Melbourne since the merger with Victoria College.

Deakin University has developed an outstanding reputation for providing tertiary opportunities for students who, for a variety of reasons, do not wish to study in an on-campus mode. Deakin has been named "University of the Year" twice, in 1995 and again in 1999. The 1995 award was for Deakin's innovative use of information technology to support undergraduate teaching programs. The Library was highlighted in the citation as an excellent service provider, especially in regard to the services to off-campus students. The 1999 award recognised Deakin's productive partnerships with corporations, government departments and professional associations, providing life-long learning opportunities to employees and members. The 40,000 students involved in these partnerships all study remotely from the traditional university campus.

Deakin University's first Vice-Chancellor stated, "University policy is to minimize the differences between on-campus and off-campus students. However, we did *not* adapt on-campus courses for off-campus use. On the contrary, we proceeded the other way round." [1] This ethos has filtered throughout the University, particularly to the Library, which endeavours to provide inclusive services, where at all possible, so any student or academic staff member, regardless of location or disability, can access the wealth of information available from the Library.

The Guiding Philosophies of Deakin University Library

All library services are based on three basic philosophies that make Deakin University Library very distinctive. It has a strong user focus. The overarching purpose of the Library is summed up in its motto ***"We help people learn."*** If a policy or procedure detracts from a student's ability to learn, changes are made. If a user need can be fulfilled in a more effective way, new or modified services are implemented, depending if funds are available, of course.

Another guiding principle is the concept that students have rights. Translated into the Library's services, all students, regardless of mode of study (on-campus or off-campus), have the right to expect a similar level of library service and support. Therefore, the Library aims to ensure that remote students have similar opportunities to ask reference inquiries, borrow books, obtain journal articles, and receive information literacy training so as to undertake independent research as do on-campus students. Deakin University Library has been servicing "virtual" students since 1977, long before the concept of the virtual campus was envisaged with the help of technology.

The final philosophy is that students should not be "taxed" for being good library users. This is particularly important for off-campus students who are not charged the direct cost of postage or courier services used to deliver loans of books or photocopies. Off-campus students have enough barriers to tertiary education to overcome without being penalised for being avid readers or diligent students. The

cost incurred by remote students in accessing library services are kept to the forefront, with web page design, for example, taking into account bandwidth considerations and software and hardware standards.

Library User Value Statements

Deakin University Library has an enviable reputation for providing services to remote (and virtual) students. One reason that the Library retains this reputation is that it seeks regular feedback from library users on the services they require. Inside the University, the Library enjoys the position of the most valued service provider within the university community, based on regular surveys of staff and students. These accolades do not come by accident. Regular, formal workshops with users and stakeholders, facilitated by external consultants, provide the input to developing the Library's strategic and operational plans. These plans result in the delivery of the services identified by users, so that the Library can "help people learn".

As a result of the feedback over a period of two years, the Library developed "Library User Value Statements", which articulate those services of the Library that really add value to the customer's experience. Five value statements were prepared reflecting the needs of the multiple market segments and stakeholders that a university library serves. The statements refer to students, off-campus students, researchers, staff and the University executive and can be found at (http://www.deakin.edu.au/library/luvs.html), as well as on printed Library brochures and service guides. The statements address the group concerned and are written in a style that emphasises the strong customer focus of the library.

STUDENTS – to help you learn, we will strive to provide

Resources

- enough copies of textbooks
- access to high demand material
- a range of electronic resources

Staff

- who are well trained and knowledgeable who offer friendly, helpful service

Easy Access

- via a catalogue which is comprehensive and reliable
- to materials on the shelves
- which is convenient and equitable

Environment

- which is comfortable and conducive to study which has enough furniture and equipment

OFF CAMPUS STUDENTS – to help you learn, we will strive to provide

Resources

- enough copies of textbooks
- access to high demand material
- a range of electronic resources

Staff

- who are well trained and knowledgeable
- who offer friendly, helpful service

Access & Delivery

- which is convenient to you
- which is fast, reliable and responsive which is equitable to all users

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IATUL

DOES THE VIRTUAL CAMPUS DEMAND A VIRTUAL LIBRARY? LIBRARY LEADERSHIP RESPONSE TO BIG HAIRY AUDACIOUS GOALS

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Collins and Poras, in their *Built to Last: Successful Habits of Visionary Companies*, describe the importance of Big Hairy Audacious Goals (BHAGs) to innovative organizations. BHAG's stimulate bold progress, enable surpassing of competitors, and create daunting but also energizing and focused direction. The distance learning and e-commerce aspirations of many of the world's universities and colleges, working independently, in collaboration with other higher-education organizations, in partnership with the private sector, or through spin-off entrepreneurial structures have taken on the character of a BHAG.

This transformation in higher education in response to the perceived expansive markets for network learning and scholarship challenges the library to rethink its fundamental nature and role. The core library processes of information acquisition, synthesis, navigation and archiving must be increasingly focused on networked and interactive access to digital multimedia information at point of need and on the creative application of electronic technologies. The virtual campus demands rampant digital content creation, new strategies for information storage and management, more sophisticated search and query techniques, dependable and secure distribution and access systems, and new approaches to rights management.

This points to a library that will integrate a more market-based, customized and entrepreneurial approach to the packaging and delivery of information, that will become a center for research and development in the application of technology to learning, that will serve as an aggregator/publisher and learning/scholars portal for these new learning communities, that will advocate the interests of the virtual campus in national/global information policy debates, and that will advance its commitment to student literacy into the new distributed models of higher education.

The higher-education market, both its academic and corporate components, is viewed as a lucrative and expanding industry. Its electronically enhanced and distributed strategies are predicted to spread rapidly to meet the growing demand. E-learning is a "killer" application. Will traditional universities be replaced by consortia of public and private players that will own the dominant coursewares that will bypass the campus classroom? Diane Oblinger and Jill Kidwell in their May/June 2000 EDUCAUSE article highlight the rationale for institutional investment in distance learning: to expand access, to alleviate capacity constraints, to capitalize on emerging market opportunities, and to serve as a catalyst for transformation. These are powerful societal, financial and organizational incentives.

The library must understand and leverage the critical changes which are transforming the higher education environment. Consider these revolutions as examples. The personal computing, electronic and network revolutions are enabling more people to have desktop connectivity to expanding amounts of digital information. The cellular revolution, including wireless and satellite technologies, is enabling an expanding sense of freedom from place, of being able to access information whenever and wherever. The music-television/video games revolution is cultivating a generation of learners and consumers who demand a more graphical, integrated and interactive multimedia presentation of information. The security/authentication revolution is introducing new strategies and technologies for managing authorized access to information. The hypertext revolution is building powerful links among the millions

of disparate files and enabling navigation among the intricacies of the new integrated if still chaotic Internet. The push revolution is shifting the nature of Web searching by narrow casting automatically to users through customized packaging and delivery of information..

The ATM/self-service revolution is encouraging a fundamental rethinking of user services as user-initiated and controlled activities are becoming more commonplace. The new majority student revolution is bringing to higher education individuals with family and work responsibilities and significant career advancement and lifelong learning needs. The intellectual property revolution is creating extraordinary conflict between the interests of information providers and information consumers as copyright is reshaped for digital and networked information. The information as commodity revolution is increasingly viewing information as articles of commerce and sources of profit rather than property held in common for societal good. The mutability revolution is elevating change and survival into organizational constants and encouraging hybrids or mutations in new structures. This random and selective list of revolutionary changes describes the environment in which the virtual campus is developing.

At the core of the advancement of electronic and distance learning are the expectations we bring to technology: more and better content, access and convenience, new capabilities, cost reduction, and growth in individual and organizational productivity. Higher education has advanced an effective network infrastructure: a common framework for interconnection, expanding connectivity, improving performance, horizontal integration, technological diversity, a skilled population, and high levels of knowledge creation and use. But the aspirations of the virtual campus will require improved connectivity, interoperability, reliability, capacity and performance, massive private sector investment, strategic public sector involvement, and demanding new applications.

As we build the technologies and telecommunications systems, we must understand and capitalize on the important advantages of the digital medium: accessibility, that is the ability to overcome the limitations of place; availability, that is the ability to overcome the limitations of time; searchability, this is the ability to probe a work in new ways; currency, that is the ability to make information available in a more timely way; researchability, that is the ability to ask new questions that could not be posed with a printed text; dynamism, that is the fluidity of the presentation and the ability to reshape the information; interdisciplinarity, that is the ability to carry out research across multiple fields and to explore new approaches to a topic; collaborative nature, that is the ability to incorporate conversation and debate among scholars and student into the use of a work; multimedia aspects, that is the ability to integrate text, images, sound and video; linkability, that is the ability to use hypertext to link a work to related materials; interactivity, that is the ability of the user to not only read and view the information, but to also interact with the digital text and images and to use them in creative ways; procedural qualities, that is the ability of the computer to carry out tasks over and over again with high accuracy and efficiency, thus allowing the user to focus on the intellectual work; spatial capabilities, that is the ability to view objects in multiple dimensions and relationships, and the ability to navigate easily through files of information; and encyclopedic potential, that is the almost unlimited capacity of the computer to store and display massive volumes of information without the restrictions of the physical format. Each of these qualities presents an opportunity for improving and expanding the virtual campus.

There are several noteworthy parallels between the development of higher education on the Internet and the history of economic development. The rush of universities and companies to stake out Web space is similar to the land rushes in many countries in the nineteenth century seeking to populate expanding geography. The radical reductions in operating costs enabled by the railroad in comparable to the economic impact of e-commerce. The initial rampant fragmentation of utility industries like electricity and telephone and their eventual consolidation is very much like the online education entrepreneurs.

James Duderstadt, president emeritus at the University of Michigan, in a February 4, 2000 *Chronicle of Higher Education* article, builds on these ideas to outline the transformation of the 21st century university: universities that view their marketplace as the world, that serve a society of growing diversity, that focus more on the creative process, that will be far less specialized and far more integrated, that offer the cyberspace classroom as a commodity, that bifurcate into undergraduate and adult institutions, that establish a lifetime of interactions with students, that are community learning

centers and knowledge networks open and available to all, and that carries out rigorous investigations and testing sites to improve teaching and scholarship.

These transformations of the future university highlight the key advantages of the Internet for distance learning: the interactivity that can be achieved, the flexibility that is enabled, the functionality that is enriched, and the costs of access to education that can be massively reduced. Universities become central to facilitating career shifts and employment transitions. Liberal arts colleges seek to prepare perpetual learners and graduate learning as a gateway to perpetual collaboration. Daily learning sustains teams of workers as higher and corporate education is integrated into the office and the factory. Network scholarship begins before college as universities expand relationships with the K-12 community. Public confidence increasingly demands routine and ongoing professional credentialing through continuing education and testing.

One of the results of these developments is the forging of new learning communities, which the Coalition for Networked Information in the U.S. describes as seeking "to promote cross fertilization of professionals across higher education who use networks and networked information resources to enrich the curriculum and to broaden student learning experiences." New learning communities focus on student productivity, student learning styles and student learning. They assume a wide matrix of learning time and space. They promote good practices, such as: student/faculty contact, cooperation among students, active learning, prompt feedback, high performance expectations, and a respect for diverse talents and ways of learning.

A recent e-College supplement to the *Chronicle of Higher Education* outlines the "Keys to success" for integrating the Internet in instruction: adopt a systems approach focusing on institutional readiness and concurrence; stress pedagogy and not technology; support the faculty; provide comprehensive online student services; provide state-of-the-art server technology; create a comprehensive marketing strategy; sustain research and product development; and plan for the long-term costs.

Successful distributed learning will require expanding content, enterprise software, sophisticated access, and a new philosophy of property rights, all areas where the library can partner with faculty. These needs have spawned an exploding educational commerce with layers of involvement, including destinations on the Internet that provide courses, educational portals or pipelines that provide organized access to education providers, and business-to-business sites that provide such things as course creation software or even library services to students.

The expanding base of experience is helping us to understand the primary obstacles to improving teaching and learning through technology: limited and uneven access, fragmented planning, underdeveloped support services, distrust and poor communication, the advancement of anybody/anytime/anywhere as a misleading educational banner, difficulty in faculty adoption, lack of information about good practice, too conservative approaches to the "fair use" of copyrighted material, inadequate faculty reward systems, and expectations that are set too high too soon.

As distance learning programs expand, there are many important policy issues to work through: alliances with the private sector, leadership appointments for faculty and administrators in educational commerce companies, the use of profit potential as the primary assessment tool, the creation of a star system/free agent professoriate, the sharing of revenue between faculty and university, conflicts in faculty commitment, and appropriate use of the university's name.

The academic library community has also recognized critical policy issues in the need for standards for distance learning library services. The Association of College and Research Libraries has prepared such guidelines which emphasize the need for equivalent services. Key components of these guidelines include: a philosophy that maintains that traditional on-campus library services cannot be stretched to meet the needs of distance learning students and faculty, management, sufficient budget support, professional staff, infrastructure, physical and electronic access to collections, informational and educational services, and documentation to demonstrate that the guidelines are being addressed.

Libraries have responded with a wide range of content and information services for distance learners:

electronic reference collections, online reference services, access to citation and full-text databases, electronic and physical delivery of materials, electronic course reserves, discipline home pages, and electronic instruction.

As universities and their libraries work together to advance the BHAG of the virtual campus, it is important to focus on critical information policy issues. These include intellectual property/copyright, Internet development, telecommunications programs to enable global access and availability, privacy, intellectual freedom, information technology research funding that also embraces electronically enhanced education, and information technology workforce development, for example. These policy areas will influence the ability of universities and libraries to advance e-commerce educational agendas.

As universities and libraries become more involved in serving a distributed and Internet-based learning community, it is important to refine the culture and processes of the organization. BHAGs demand a new physical, expertise and intellectual infrastructure. They require a new understanding of the geography, psychology and economics of innovation. And they encourage the adoption of entrepreneurial practices like business plans, competition and venture capital.

The virtual campus remains in all settings a Big Hairy Audacious Goal, a bold aspiration that will dismantle the university as we know it, and replace it with a more agile, aggressive and market-driven organization. Will the virtual library be an influential and essential component of this future academic environment? Bold leadership, economic savvy and entrepreneurial risk-taking will dictate success and survival.

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VIRTUAL LIBRARIES: SERVICE REALITIES

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A Society in Transition

Today I would like to discuss some of the client service issues to be considered when transiting to a virtual library situation. But before I discuss client service in an electronic environment, I would first like to take a brief look at our world: the world in which our institutions exist; the world in which we and our users will continue to operate.

Michael J. Mazarr, in his book, *Global Trends 2005*, focuses upon the transitional nature of society in the knowledge era and identifies several themes which are relevant to libraries:

- paradox and a contradictory nature
- a blurring of boundaries
- networks, systems and holistic thinking
- process, not product; becoming, not being; experience, not thing
- change is costly

The first is paradox, which he identifies as the single overriding aspect of the social transformation under way today. He goes on to say that the knowledge era is a time of inconsistency and ambiguity; that there is decentralization within globalism; fragmentation within mass culture; expanded individualism within stronger community, and absolutism within relativism. Society's complex transitional state makes it difficult to identify uncomplicated trends; and there is a central paradox for libraries who are finding that the increased requirement of our customers for simplicity of interaction with our organization creates greater complexity for us as managers.

The second aspect is a blurring of boundaries; between disciplines, industries, and social enterprises. Things we were accustomed to seeing as highly distinct endeavours, such as acquisitions and cataloguing, or even circulation and reference services, become, if not one and the same, at least much more alike than they have been. Reengineering and reorganizing have become commonplace in libraries that hadn't seen major conceptional organizational changes in decades. The inter-industrial phenomenon is causing businesses not to think about what industry they are in, but what core competencies they have to offer and what industries they could enter. The other major factor of importance is that boundaries between disciplines are less important than the threads that connect them.

The third theme described is that of networks, systems, and holistic thinking. "Dominant functions and processes in the information age are increasingly organized around networks." [Manuel Castells, *The Rise of the Network Society*] Nowhere are networks more significant than when increasingly virtual corporations come together in temporary partnerships and alliances. So we have come from interdisciplinary blurring of boundaries to networked interdependency. The implication here is that processes produced by a networked era cannot be understood as individual activities or singular events but must be thought of as systems, interactive sets of enterprises that move forward in a coevolutionary pattern with one another.

The fourth theme Mazarr discusses is process not product; becoming not being; experience not thing. The knowledge era is a time dominated by ideas and concepts, and as such, reduces emphasis on

tangible things and increases the emphasis on abstraction. The dominance of process and experience manifests in a number of ways. Services, for example, are a form of process rather than a specific product. Education has become a lifelong process rather than a one-time event. The responsibilities of academic libraries to institutional alumni or continuing education participants need to be redefined, as these activities become increasingly established in our society. Moreover, there is the concept that the overall quality of a library can often be deduced from the quality of its processes. A concept that gives rise to program performance evaluation, operational performance targets, and benchmarking best practice. As well, in an era of rapid change, there is more emphasis on the idea of becoming: constantly improving and advancing and evolving, but never actually arriving. To use Mazarr's words, "...we must adjust our mind-sets for an era of constant change and inexorable innovation."

Change, however, is costly. I frequently imagine our Vice-Chancellor and the Pro Vice-Chancellor, Planning and Resources, joined in common prayer, "Dear Lord, if I give the Library a million dollar system, will they be able to reduce staff?" Along with, "Dear Lord, if I encourage collaboration, will they be able to reduce staff?" We are in the midst of a major change in the way we do our business, and the transforming information world is considerably disruptive for libraries. It causes social stress and psychological strain in addition to the need for increasingly costly infrastructure.

To these trends I would add, a diminishing sense of place for many transactions. As we become increasingly remote from our clients, many of them will have no 'real' perception of the library as a physical space, nor have library staff an understanding of the clients' spatial reality. A tremendous amount of interaction with businesses today is done via call centres. It used to be the case that one might be connected with a call centre somewhere in one's home country. The current trend in Australia is to establish call centres in India, giving staff Australian names in the process. This gives a new dimension to the term off-site. Reconsidering processes in terms of physical locations offers new opportunities to libraries in terms of managing facilities and offers the possibility of purpose built service centres for clients who will never come into the library. The new service space, as opposed to place, will require technological and communications infrastructures plus a knowledge base and substantial staff training.

Peter Drucker describes what is happening in our society. "Every few hundred years in Western history there occurs a sharp *transformation*. We cross... a 'divide'. Within a few short decades, society rearranges itself – its world view; its basic values; its social and political structure; its arts; its key institutions. Fifty years later there is a new world. ...We are currently living in such a transformation. (p. 1)

Corporate Trends in Today's Society

If Mazarr has identified trends of a society in transition, Robert Baldock in his book, *Destination Z: the History of the Future*, has listed the top ten shifts in corporate behaviour that provide the most telling pointers to the future:

- broadening of the range of products and services on offer
- creation of new value propositions
- virtualization of organizations
- the ways in which companies are getting closer to their customers
- the addition of demergers to traditional mergers and acquistions
- formation of strategic alliances
- the growth of outsourcing
- expanding globalization
- rapid entry of newcomers into old markets
- customization.

We can look at these issues from a library point of view.

Broadening of the range of services on offer is taking place daily in libraries: we have electronic reserve, direct document delivery, digitization of course materials, specialized pages in support of specific units, subject specific gateway services, computer based information literacy teaching programs, the list is

endless. The list is also electronic.

The creation of new value propositions is an interesting concept. I have been in several situations where library staff have been asked what business are you in? And the best response has been, the information business. But what does this mean when circulation staff believe they loan and shelve books rather than making information available, and reference staff are now acknowledging that citations are a form of information, an information address as it were, but clients want the real thing. And that is where full text databases with their capability for end to end services, from access to location to viewing to downloading or printing, are moving libraries into real information supply direct to the user regardless of location. To continue this train of thought, libraries need to look long and hard at what else they could do. For example, university libraries might form an alliance with university bookshops and piggyback off of each other's systems. Our library used to run a photocopying service. This evolved to include desktop printing, managing operations for other institutions, and retailing a range of replication supplies, many in direct and unwelcome competition with the University bookstore. The manager of that service kept creating new value propositions, ie new services, in order to ensure his continuing existence. An excellent example of value added services is Microsoft Officeworks. By bundling and integrating applications, Microsoft has created a powerful tool that is genuinely greater than the sum of its parts. The convenience is outstanding.

Virtualization of libraries is with us now, although the preferred option at this point is the hybrid library. Libraries actually have four choices:

- not to go electronic
- to offer electronic services as well as traditional services, initiating the changes on an ad hoc basis as opportunities arise
- to establish a group charged with the creation and maintenance of integrated electronic services
- to cease traditional operations and go for cyber operations.

Our library is currently in stage two of the process, and as part of this we have reached a point where it is necessary to take stock of various existing services and developments and those soon to be implemented, and to consider how they all fit together and what our future configuration will be. Not only are people concerned with the shape and direction of our electronic services, there is substantial pressure to define the relationship of electronic to traditional services and to ensure that we articulate the value of both. I believe that the traditional services in academic libraries will only last until there is a critical mass of digital material available, particularly with the advent of the electronic book. I also believe we must manage the transition more holistically than we have to date.

I would like to return to ways in which libraries get closer to their clients later, but there is a growing corporate strategy that I think is worth considering; and that is disintermediation or cutting out the middleman, as middlemen by definition act as a barrier between suppliers and their ultimate customers. Toyota motor company is actively exploring selling directly to the buyer rather than going through dealers. They have created an interactive web page with outstanding follow up. I know, because I picked my last car by searching on the Internet. Toyota sent me reams of information, approximately half an inch, on each model in which I expressed an interest. This was followed by personal phone calls offering to bring cars to me to test drive. I really appreciated that service, as I don't want to take days of my scarce time to go to car dealers to canvass the market. I would simply like to make one point here, to many information suppliers libraries are the intermediary between them and the information user. I do not know what the future will bring, but if I were a publisher or a vendor of academic or research information, I would be seriously wondering if I could reach a greater market by going direct. While libraries have grown beyond the belief that they have a monopoly on their clients, I am not confident we have acknowledged the very real possibility that our suppliers might simply go around us to our clients.

Mergers and acquistions and demergers today are different from the past in two ways: there are fewer contested takeovers as most take place between consenting partners, and much of the activity involves the breaking up of old style conglomerates. The logic of large conglomerates was that of ownership and rigid central control of all of their diverse bits based on the belief that the centre's general management skills could be applied with equal effectiveness to any business. I must admit this strikes a chord in

response to our own operations across four branches. Our library is centralist in nature and offer a relatively standardized service on the grounds that clients expect consistency in all locations, somewhat akin to fast food outlets operating all over the world. However, as time passes, I find myself in greater sympathy with staff in the branches who have, over the years, voiced the desire to tailor their services more closely to the needs of their users. Each branch already has its own distinct personality and way of doing things, and now may be the time to capitalize further on this. I believe our clients, who could also be termed our virtual communities, will increasingly expect products tailored to their needs. Libraries, when approaching service development, have normally catered for the mainstream, and electronic services, by their very nature, can promote standardization.

The formation of strategic alliances are radically different from the ways in which libraries traditionally operated. Our library is in partnership with Blackwell's for supply of shelf ready books, a significant joint venture worth millions of dollars. There are several important outcomes, both anticipated and unanticipated, which have arisen from this initiative:

- a reorganization of acquisition and cataloguing operations into one unit and a movement of some acquisitions tasks into client services
- shift of part of our staffing costs into our acquisitions budget, an important factor in an organisation where resource allocations are protected but staffing budgets are not
- the ability to accommodate substantial downsizing within the library
- significantly improved turnaround times from order date to shelf availability
- creation of a new role to manage the relationship
- possibly most significantly, a cultural change where the library sincerely sought to work in cooperative partnership with a supplier, including establishing interactive systems which would be termed extranets in e-commerce speak. Needless to say, this cannot be achieved without building a certain amount of mutual trust.

Outsourcing is a strategy we have not utilized so much as we might, although we have been using it for years in terms of hiring consultants to determine, analyse, and report on client needs, and increasingly we find ourselves outsourcing training for our staff, particularly in IT areas. On a larger scale, our university has recently outsourced management of its salary sacrifice activities, not I suspect because the service is better, as it isn't; but because the amount of varied packages available to employees will create an administrative demand the University is not prepared to meet. The range of potential opportunities for libraries is great, the time necessary to investigate, initiate, and manage these opportunities is also. Many libraries have flirted with the idea, but there appear to be few marriages to date.

Not only are barriers between industries breaking down, so have the barriers created by distance. Globalization is affecting the higher education industry as many of our institutions scour the globe for new markets. And where the university delivers, so too does the library, in all time zones.

The rapid entry of newcomers into old markets can be seen in the library world by two current developments: Net.library and Questia. At a recent demonstration of Net.library in Brisbane we were told that it aims to provide a single, flexible ordering and service entity with enhanced reporting capabilities including extranet usage statistics. Net.library's 325 employees include professional librarians and people from the publications industry. The strategic investors behind Net.library include Houghton Mifflin, EBSCO, OCLC, McGraw-Hill and Blackwells. They consider themselves a *content* provider who will distribute electronic books to libraries. The beauty of the service is that it mimics traditional library operations and uses Collection Manager as an ordering system. This makes it easy to relate to Net.library. When queried about individual clients, the demonstrator said that the original model allowed for them, but they now focus on libraries because, "no one wants to build up large electronic libraries." A statement open to question, particularly when a quick look at the Net.library web site did not give the impression they would turn away an individual interested in joining. It may be that the going rate of 150% to 'buy' a book will deter prospective clients, but those who can afford the price can take their library with them as long as they can access the Internet.

In contrast to Net.library, Questia is aiming directly at the end consumer. Here is a sample of what they promise:

- an entire collection searchable by a word, phrase, or concept so you can instantly find the most relevant paragraph
- a full selection of credible, high-quality books and journals
- simultaneous access by an unlimited number of people to a given book at any given time
- the ability to view, copy and past text from any page of a book
- tools that allow you to compose and save papers online
- footnotes and bibliographies that are hyperlinked across books and journals
- a state of the art Customer Service Center, accessible 24 hours a day, seven days a week.

Questia's goal is to offer a complete research service and their target market is university students and scholars who will be charged an 'affordable' subscription fee to gain access to an online database of 250,000 books. Even more interesting: "Questia has developed a way for publishers to receive revenue each time a student accesses even a single page of a book or journal. This has never been possible before. Thus, older titles and out-of-print books that may have been perused thousands of times in libraries and have not generated any new income will produce new revenues and once again become valuable assets for publishers." "This is a win/win situation for publishers." Seventy publishers are said to have given the nod to the system.

The Questia model is not unlike that of Net.library, except that Questia is not selling site licenses to libraries and is also paying publishers by the page view. Whether Questia will be able to deliver on their promise and how successful their service will be remains to be seen; but, as proposed, it is a classic example of eliminating the Library middleman by being a new player in an old market. It is also a good example of value added service. In fact, when developing the service, Questia must have asked, "What do researchers and students do?" and "How do they do it?" as opposed to "What information do they need."

The final corporate trend identified by Baldock is customization. We are moving from standard products to customized products for niche markets. When Levi Strauss will manufacture a tailor made pair of jeans to your personal specifications and BMW allows buyers to extensively determine their car configuration, we have come almost full circle back to a quasi-cottage industry, as information and communications technology allow individual objects to be created in factories designed for mass production. As a side issue, individually crafted jeans or cars create a relationship between the buyer and the supplier that purchasing off the shelf packages does not. As librarians, we are well aware that we have a mixture of clients to serve, and the electronic approach allows us to start tailoring services to meet those needs. There has already been a paper at this conference on a pilot study by University of Queensland Library's Customised Information Services Group. It is clear that while electronic systems can be used to standardize services, they can also be used to make them flexible and relevant.

Getting Closer to the Client

How do libraries get closer to clients at a time when clients are getting more remote? The standard answer is to know more about your customers. User surveys, focus groups, and other activities to determine client needs are now a standard in libraries. In 1998, the QUT Division of Information and Academic Services conducted a survey of undergraduate students perceptions and expectations of certain services that were either currently offered or which should have been offered by the Division.

Findings indicated that undergraduates have three key needs addressed by the Division:

1. consistent experience of supportive face-to-face and virtual relationships
2. becoming informed and competent learners
3. easy and timely access to quality resources and services.

Supportive face-to-face relationships that position the student as client were particularly important in the context of the University Library and the Student Computing Helpdesk. Students argued that such relationships develop their confidence and competence in the University setting.

Students expected the Division to ensure adequate and flexible staffing practices to enable quality service from staff. As an aside, it has not been unusual for students when commenting on quality of service from the Library to make the observation that the service is good but that the library needs more staff.

The report went on to say that managing virtual relationships was becoming an increasingly important skill for students.

And the capacity to access expanding knowledge bases was highly valued.

Students appreciated being able to access services and resources from any place at any time. The QUT data warehouse was given exceptional praise for making centralised and relevant information available in a user-friendly manner.

Most importantly, students expected that *initiatives promoting flexibility, efficiency and convenience will be a feature of future developments in the Division.*

They appreciated initiatives that support a shift from client service to *self-service*. However, with this they also expected the Division to maintain the capacity for personal relationships with students as an essential complement to the self-service directive. In fact, in every focus group conducted, student relationships with staff were given the greatest emphasis.

Gratifyingly, "The University Library was recognized to be the gateway to their success as students."

Investigate Client *Behaviour*

An area that has received less attention is investigation into client behaviour. Organisations conducting their business via e-commerce are now using data mining techniques to match up demographics and client needs and they are also tracking and examining electronic transactions. Libraries could do this too, particularly with reference services, or to detect patterns and trends in collection usage, but they appear to not be taking up these opportunities, possibly because real data-mining requires more software applications, or, most probably, because someone somewhere has to then absorb and make sense out of the data collected. It is far easier to collect process data or ask clients their opinions than to uncover behaviours and trends through extensive analysis. It may be time to add new tools to the kit.

Client Centred Design

We achieve client centred services through client assisted design. Personally, I have never considered libraries to be client friendly organizations. Library *staff* are friendly, but the systems have been cumbersome and complex to use, particularly as completion of a process might involve several steps in several locations culminating in matching up that mysterious entity, the call number, with an item on a shelf. Is it any wonder that today's users embrace electronic versions with alacrity, and probably with relief as well? Library conventions are transparent in the electronic world, and better still, the information can come to you. It is worthwhile noting that a system in which information comes to the client is many times more efficient than one where the client comes to the information. And this efficiency benefits both the client and the library. But to return to the point of client designed services, determining client need is not the same thing as designing the service to meet that need

How do we achieve client centred design? I cannot give you a blueprint, but I can identify some of the strategies for increasing the likelihood of useability:

- set up a cross functional project team. Do not simply hand a lending project to your lending staff. Include staff from other areas. This will give you insight on how the service might interact with other services.
- find a client(s) to sit on the group to give advice at the planning and testing stages
- armed with client needs and technology options, think creatively about possible solutions. Approach each service as if it were the first, in order to keep a fresh perspective.

- adopt an evolutionary approach: develop, test, refine, test, refine, then deliver.
- observe real clients using the service in real situations where possible.
- and, revisit and evaluate the useability of the service in action

Client Relationship Management

Finally, in addition to learning more about client behaviours and involving clients in service design, a current trend is on building long term client relationships, referred to as customer relationship management (CRM). CRM means segmenting customers and tailoring services to create value. Our clients really don't care how libraries store information, or that data from different sources must be combined to give them what they want, they don't even care if they call the wrong location. What they do know is that they want good service and they want it now. In industry, with increased competition, globalization, the growing cost of customer acquisition, and high customer turnover, CRM is viewed as critical to survival. It is one of the reasons for loyalty programs like frequent flyers or fly buys. CRM seeks to understand: who are the clients, what do they do, and what do they like. CRM is defined as an integrated marketing and service strategy that depends on coordinated actions. Universities have a long history of building relationships with graduates, businesses, and other sectors of the community where mutual benefit can be identified. Libraries have not operated on this level but the concept of managing client relationships goes beyond client service. I found this quote from *e-Business Roadmap for Success* interesting:

> *"Most companies consider themselves customer focused, but in reality, they're product-centric. Meanwhile, e-commerce has increased customer expectations, and customer expectations have raised the bar on service levels." (p. 109)*

Strategic Planning for the Virtual Library

Virtual libraries need strategic planning as much as hard copy libraries. Successful models for e-libraries will be unified and user-centric. They will focus on clients, marketing, and competitive positioning as much as on internal operations. We are already familiar with the planning processes of tracking changing environments, understanding user needs, and formulating strategies and implementation plans to meet those needs. This whole exercise also needs to be done from the electronic perspective.

Conclusion

Now is not an easy time. Given today's society, where speed and convenience are becoming paramount to our virtual communities, ours is the task of implementing top quality client service that is consistent with our users' experience in the rest of their lives. We cannot view our systems and practices in isolation.

What are some of the strategies for successful transition to electronic mode?

1. **Educate, train, and promote** to managers and staff as well as clients and partners. We need to educate in terms of what we are trying to accomplish as well as introduce changing services in order to promote acceptance. A good virtual library will never be achieved without top management support. Nor will it come into being without staff commitment. The cultural change supporting the transition is as important as developing a sound infrastructure.

2. **Review current distribution channels** to determine the potential effect that electronic operations will have. Determine the relationship of electronic services to traditional, and be clear about the anticipated configuration of both.

3. **Understand what clients expect from the Web** and how many are able and willing to interface with the library over electronic networks and to conduct transactions with the library in this way. The goal is a user-friendly web interface.

4. **Re-evaluate the nature of library services** to determine if there are other, better, or customized

services which could be offered. Effective and continuous monitoring of the environment is necessary to support new service development. Look for services that are good or better in electronic mode.

5. **Adopt client centred service design** using inclusive teams and extensive testing and review.

6. **Give new roles to staff** to support a cross-functional focus and total integration with overall library strategy, other library systems, and university and external systems.

7. **Extend current business to the outside** by linking with other online catalogues, information literacy programs, Internet addresses, etc. to expand electronic activities and help to shift your client interactions to electronic mode. The idea here is to develop a critical mass of interactions.

8. **Develop a Web-centric marketing strategy** clearly targeting the Web as a primary marketing channel. The Internet needs to be a major medium for all marketing communications activities including press releases and actual campaigns to take advantage of digital interactive marketing.

9. **Instil electronic management style** by moving decision making from physical to electronic space. Most libraries now operate in two spaces, the traditional physical one, and the developing electronic one, mediated by the Internet. Libraries need to manage in both spaces.
10. **Develop a good technical infrastructure** with a sound knowledge base supporting it.

11. **Provide a secure, well-controlled system.**

12. **Provide adequate resources.**

As I finish, let me tell you a short story. My car needed some repairs, and as it is a company car I needed to go through the relevant processes. As this is not an unusual situation for me, I had learned the various procedures for managing a car repair in the QUT environment, but now it is outsourced, and I was directed to a web page. I didn't feel confident with the information available, so I called the person listed as the contact. I explained my problem and the conversation then went like this:

the contact: *"We have a web page."*
me (brightly): *"Yes I know, that's where I found your name and number."*
the contact (irately): *"But you are not supposed to call me."*
me (annoyed): *"Look, I have 3 short questions. Could you please answer them?"*
the contact (impatiently): *"I really am too busy to be talking to people, You are supposed to read the Web page"*
me (enraged): *"And I am really too busy to read your Web page. Could you answer my questions?"*

And so it went. The irony is that their web page was not that bad, but their service was terrible.

My penultimate point is that an organization should, at all costs, avoid the tendency to believe that once an automated service is established the job is done. A library should never rely solely on electronic services without backing them up with people who can handle a query or problem. And my final point is, never allow a staff member to back up an electronic service without ensuring they live and breath polite, courteous, high quality client service.

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IATUL

IN TECHNOLOGY WE TRUST – A PERSPECTIVE FROM UP NORTH

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Introduction

The recent and rapid development of information and communication technologies and the development of the information society as a whole are affecting the higher education all over the world. It has among other things been predicted that there will be no need for formal university institutions /1/ and that private companies turn into "virtual universities" offering just-in-time education suited and tailored according to the needs of the employers /2/. There are, however, also initiatives such as the Fathom.com where leading educational and cultural institutions come together to form an online knowledge company (URL http://www.fathom.com) and trust there will be a demand for their superior know-how in the virtual educational marketplace. These institutions will naturally also sell their courses to those in need of culture and education. It seems that all parties involved agree that education has become a commodity of the information society.

Exploitation of digital media in education shifts the learning from broadcast learning to interactive learning. In the new environment the roles of the teachers and the learners will change. Also the concepts related to the nature of learning (linear, sequential to hypermedia, instruction to construction and discovery) will carry a different meaning. Furthermore, learning as an experience will be fun rather than dull /3/.

Higher education has always been a versatile collection of teaching and working methods such as dialogue, debate and discussions, group work, assignments, tutoring, independent study and feedback. To transform these methods to exploit the information and communication technologies the best possible way is the challenge for the virtual universities. The academic libraries have enjoyed a valued position in the print era but the recognition needs to be earned again in the context of the digital media. The management of a very heterogeneous set of networked learning materials will be a major challenge for libraries.

Virtual University of Finland

National educational systems can hardly rely on commercial, virtual educational offerings found via the network, even if these are of superior quality and even if international co-operation is highly encouraged. In this respect the eEurope initiative of the European Commission is important as it aims to promote the use of information and communications technologies for education and research all over Europe. The current response in Finland to the policy decisions made elsewhere and within the European Union in particular has been the establishment of the Virtual University of Finland. On the national level to ensure competitiveness in education and research the action plan of the Ministry of Education for 2000-2004 concerning the online university features support to content provision (i.e. course production), support for teaching as well as to teachers and learners, promotion of information and communication technologies in teaching and also development of assessment and control mechanisms. The online university will be formed as a consortium of the existing universities willing to support the initiative and the co-ordinator for the consortium is located at the Helsinki University of Technology (HUT). The annual budget for the online university will be about 15,5 million USD for the period 2001-2004. The Ministry of Education is funding half of the budget and the other half is expected to be contributed by the universities themselves, by the European Union and by Finnish communities and companies. The target group for participants in the Finnish virtual university will be university students, company employees and students pursuing further education. /4/.

Concerning the media skills in general at the moment a very recent assessment survey of the outcomes of the national information society strategy 1995-1999 showed that even if the technological prerequisites (broadband network, equipment etc.) now exist in the nation´s universities the general skills among the teachers and students regarding information literacy are not sufficient. Also there is a lack of technical support and pedagogical skills. Hence the virtual university must emphasise and organise the education of teachers before a truly national multidisciplinary virtual university becomes a reality. In the assessment the libraries were considered to have succeeded in meeting the objectives set for them in the 1995-1999 strategy even if the academic libraries suffered from inadequate funding. /5/

The information literacy competency standards for higher education by the American Association of College and Research Libraries are an excellent list of clearly defined objectives and the subsequent skills required by an information literate individual (URL http://www.ala.org/acrl/ilintro.html). But they also indicate quite clearly that it takes a university, not just the library to produce such an individual and in this respect the need of co-operation between the teachers and the librarians is evident. It is clear, however, that each library must define its own role in its own institutional context.

Parallel to the development of the Finnish Virtual University there will be the development of the Virtual School. There the objectives include the establishment of a generic school portal to the networked learning materials. From the academic library´s point of view it will be important to follow this development because the university students in 5 to 7 years time will be the products of this virtual school. Many of the information literacy skills are or should be already adopted at this stage.

Course re-engineering for virtual university

The HUT library courses on scientific information searching were redesigned a year ago and the student response towards the new courses has been very positive. The participation in the international DEDICATE distance education project (http://educate.lib.chalmers.se/DEDICATE/dedindex.html) had stimulated the initial course revision decision and it also provided the library staff with necessary background information regarding the new course design. The objectives for the new courses included more intensive integration of the networked electronic campus library materials because an increasing number of students will primarily use only the networked library services. Some students are likely to bypass the physical library services altogether. The library information specialists were trained to become course tutors. Tutoring via e-mail provided the information specialists with a personal and a much closer contact with the students than before. Yet another more general aim for the redesign process was to market the electronic library services and thus promote the dynamic nature of the modern library supporting higher education and research. In this respect the FinELib library consortium programme (URL http://hul.helsinki.fi/finelib/english/index.html) launched by the Ministry of Education three years ago has been of great help. The biggest challenge regarding the FinELib consortium at the moment is the development of the graphical user interface for unified access to the some 3000 full-text journals, 80 reference database, dictionaries and reference books acquired by the FinELib. Regarding the virtual university the FinELib licence agreement allow the use of the materials for educational purposes. The teachers may take extractions, such as articles of these electronic resources and include them into the (non-commercial) courseware they prepare for their courses.

Today the redesigned library courses run four times a year and last for 5 weeks each and equal 1 credit in the curricula. The courses include one 2-hour introductory lecture after which the students follow the subsequent three web-based distance education modules quite independently. Active communication with tutors is of course recommended. The main benefits of the library course design include its flexibility: it is now easy to integrate it to any academic courses, especially those involving problem-based learning or networked materials. This integration has in fact already been tested in the context of a course for students majoring in information network planning, the library extended the length of its own course to meet the original course which run for the whole semester and provided a tutor to help in information searching. In view of the evolving virtual university the new library courses fit in very well. Furthermore, the web-based material made it quite easy to run these courses also in English (URL http://www.hut.fi/Yksikot/Kirjasto/Palvelut/Koulutus/Informatiikka/#in English). The courses were also accepted to the curricula of HUT open university starting with the autumn term 2000.

Another challenge: the wireless environment

In the networked environment it is the wireless communication which is growing most rapidly and new mobile services are being developed at high speed. The number of mobile phones in Europe is expected to increase manifold by 2003 when there are 237 million estimated users. By then some 85% of the mobile phones are expected to be able to use Internet services through WAP-technology (wireless application protocol) /6/. The WAP –phone allows the user to access the Internet and use the networked services via the wireless mark up language (WML) /7/.

In the knowledge society the mobile users will wish to access services from home, while commuting, at work, on the street, in the nature, in the car, at the airport etc. The library services are no different from other services in this respect. As much as our current users take the Web-based access to the library catalogues for granted, the future users will expect to access the library when and where they choose or prefer at any given moment.

The media is also becoming more and more versatile. Instead of one single communication device people will have different instruments and different alternatives to use the media and services. In the long run the various digital library services will be produced according to the appropriate standards in such a way that the same information content can be converted or used through different communication methods and devices. For instance, a mobile phone as a device is different from a workstation: it has less bandwidth, more limited power supply, a very much smaller display and a different type of keyboard. The present Web-based digital library services have been designed to be used by a HTML-browser and viewed by a 17´´ display monitor. Therefore the current digital library services are not suitable as such to be used by the mobile users. Figure 1 tries to illustrate this so called multi-channel delivery of services.

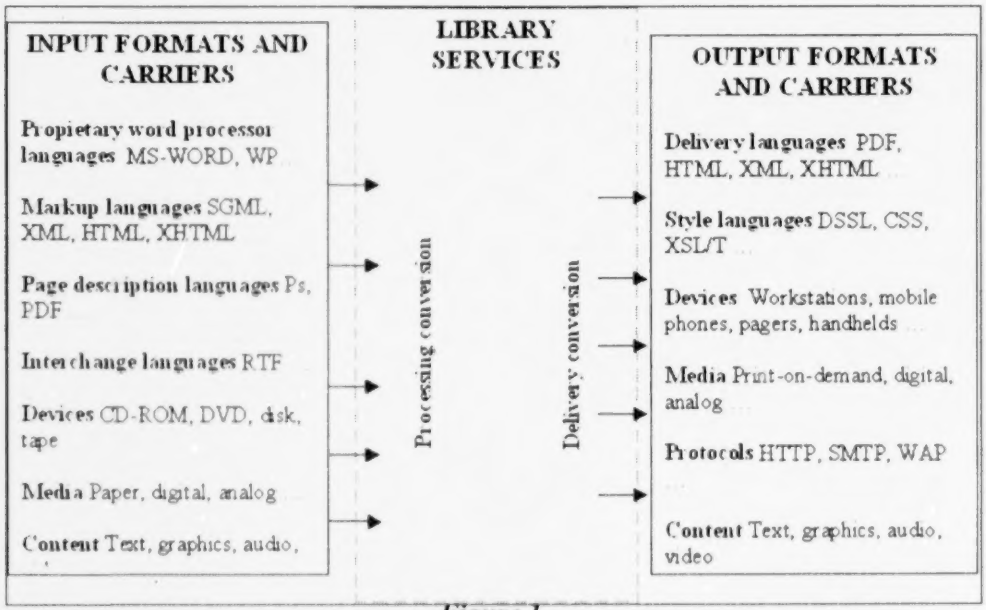
INPUT FORMATS AND CARRIERS
Propietary word processor languages MS-WORD, WP
Markup languages SGML, XML, HTML, XHTML
Page description languages Ps, PDF
Interchange languages RTF
Devices CD-ROM, DVD, disk, tape
Media Paper, digital, analog
Content Text, graphics, audio,
LIBRARY SERVICES
Processing conversion
Delivery conversion
OUTPUT FORMATS AND CARRIERS
Delivery languages PDF, HTML, XML, XHTML
Style languages DSSL, CSS, XSL/T
Devices Workstations, mobile phones, pagers, handhelds
Media Print-on-demand, digital, analog
Protocols HTTP, SMTP, WAP
Content Text, graphics, audio, video

Figure 1

The multi-channel delivery of digital library services and materials. In the processing conversion the heterogeneous material or their metadata is unified to fit the library´s standards. In the delivery conversion the special conditions and features of the carriers, such as the small display of the mobile phone, must be taken into account as well as the appropriate standards used by internet browsers and preferred by library users.

User expectations

"The mobile communication will revolutionise social structures: timetables which have ruled the labour force all through the 20th century will no longer bind people. The navigation and control points will be those accessible here and now through telecommunication. Nothing will be agreed explicitly and the number of individual options will be kept as large as possible. Extempore will become a common

lifestyle. Services and communications are required for 24 hours a day. Those already working beyond the traditional timetables are e.g. students and freelancers." /8/

To be aware of the expectations of the current users as the new technologies emerge a user survey concerning HUT library services was conducted in April-May 2000. The questionnaire was distributed as a fill-in Web form as well as in print and 366 users responded. Of these 74% were HUT engineering and architecture students, 19 % were HUT researchers and other staff members and the rest 7 % were external users. The Web form was linked to the library´s homepage and the majority of returned forms (71 %) was received electronically as Web-forms.

In figures 2a, 2b and 2c the frequency of library visits and use of services by user group is presented. There were clear differences between the user groups, by and large the students were more active as users of the physical library services whereas the researchers used the digital library services more often. The majority of the researches used the digital library services on weekly basis. The external clients used the services mainly on the library premises due to the fact that they may not access the licensed electronic resources remotely.

The devices possessed by the users were also surveyed and results are presented in figures 3a, 3b and 3c. The number of mobile phones owned by students was impressive, 94 % of the student respondents carry a cellular phone. There is one conclusion which may be drawn from this figure: the switch from GSM to WAP will be very quick among those already familiar with mobile services.

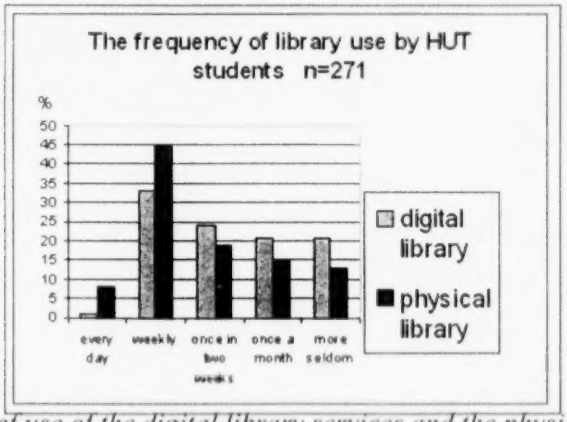

Figure 2a. *The frequency of use of the digital library services and the physical library premises by the students of the Helsinki University of Technology.*

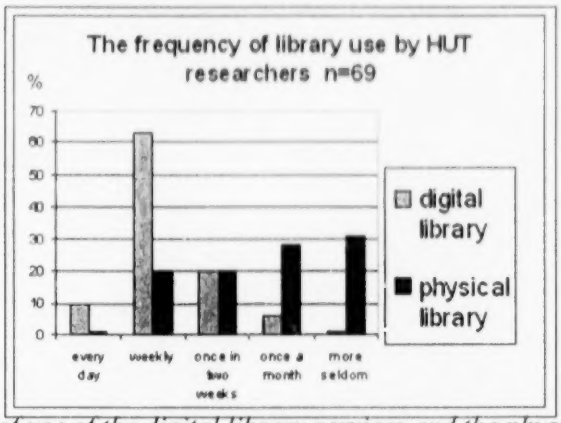

Figure 2b.. *The frequency of use of the digital library services and the physical library premises by the researchers and other staff of the Helsinki University of Technology.*

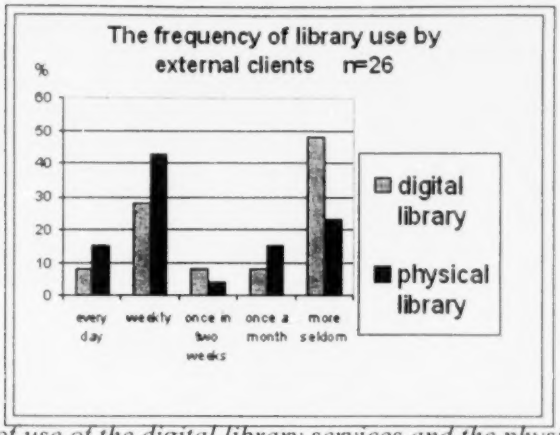

***Figure 2c.**. The frequency of use of the digital library services and the physical library premises by the external clients of the Helsinki University of Technology Library.*

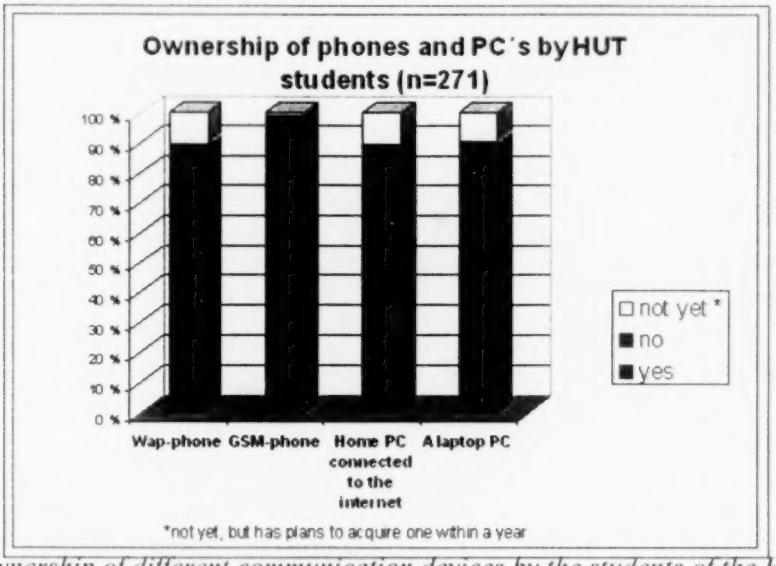

***Figure 3a.**. The ownership of different communication devices by the students of the Helsinki University of Technology.*

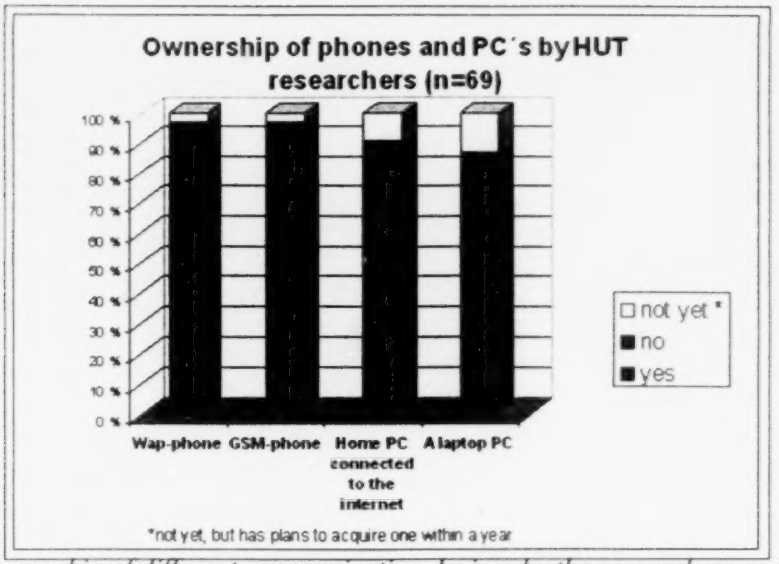

***Figure 3b.**. The ownership of different communication devices by the researchers and other staff of the Helsinki University of Technology.*

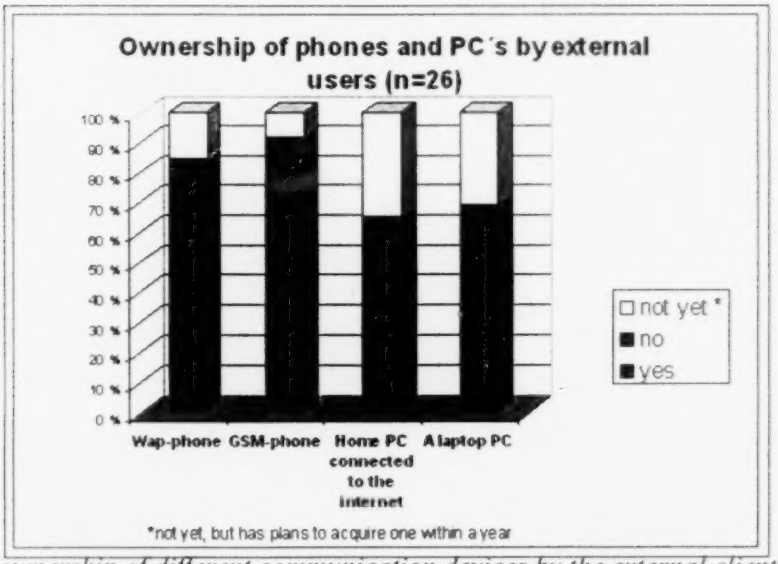

***Figure 3c.**. The ownership of different communication devices by the external clients of the Helsinki University of Technology Library.*

In the questionnaire the respondents were asked to consider the personal value or importance of named library services. The following statements were considered most important:

- Library use is easy and flexible
- Library use is free of charge
- Library performs its services in a reliable and accurate manner
- Library provides up-to-date service
- Visits to the physical library and seeing the staff personally when needed
- Library staff knows much about library and its services
- Library provides fast service

The different user groups were quite unanimous in ranking the important issues related to the library services. The library services considered least meaningful included those not yet implemented and thus

still of imaginary nature, such as icon messages to mobile phones (announcing the arrival of a reserved item), paying fees through a WAP-phone, use of the wireless network services from all reader seats around the library, etc. The majority of the respondents wanted to receive library announcements (e.g. reminders, claims, renewals of loans) via e-mail only. They also trusted the internet-based services as a secure method for money transactions.

Conclusions

In general there are several direct implications derived from the electronic commerce which apply to the academic libraries as well: more direct delivery routes to the end users, no geographical monopolies, instant custom design possibilities and virtual market testing. From the library's point of view it is important to be prepared to constantly develop and modify services and monitor the users and their expectations. Once the mobile services are commonplace also the library services must be accessible "on the road". The challenge of being up-to-date calls for more flexibility in the delivery of library services. In this respect a high-quality library service development process with a adequate innovation strategy is necessary.

The library support for the virtual university calls for new strategies as well. The knowledge concerning electronic (scientific) publishing, licence management and metadata found in academic libraries are examples of special expertise necessary for virtual universities. Furthermore, the publishing process of the virtual university might require ad-hoc decisions in situations where standardised practises do not yet exist. There the library needs to apply its knowledge in an innovative way to find temporary solutions. But being well prepared means the job is half done.

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IATUL

THE VIRTUAL CAMPUS: IMPACT ON TEACHING AND LEARNING

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WHAT IS A VIRTUAL CAMPUS

The Virtual campus or Virtual university can be defined as a set of technology enabled functions making possible interactions between the different groups in the university (student, teaching staff, management and support personnel) without the need to coincide in time or space.

In practice, there are two main models for the virtual campus emerging. The first of these is one in which an educational institution uses communication and information technologies (CITs) to provide all conventional services. In the second model, services are unbundled, with some being sub-contracted to other organisations.

A robust example of the first model, the total virtual university, is hard to find, although there are many examples of institutions moving into online education for some courses or programs. These include both commercial arms of traditional universities and the newer providers such as corporate and for-profit universities. Many traditional universities are also gearing up to provide what were formerly distance education programs in an online mode.

Examples of the second model are more prominent. The much publicised Western Governors University brokers courses that are developed and delivered by over 40 participating institutions. The Universitas 21/News Corporation joint venture is another example, as is the Global University Alliance which will use the platform of NextEd to deliver courses on behalf of its nine member universities. NextEd provides the necessary online campus functionality, including teaching and learning software, student activity tracking, electronic communications, call centre technology for student services and support and online marketing.

The current state of play is comprehensively described in a major study released in Australia last month, of the growth of non traditional educational institutions (e.g., corporate and for-profit universities) and their impact on the traditional non-profit university sector. Entitled *"The Business of Borderless Education"*, the report concludes that "notwithstanding the rapid growth of online delivery among the traditional and new providers of higher education, there is as yet little evidence of successful, established virtual institutions, either as Internet-based educational providers or as "hollow" organisations which broker the programs of other educational operations". (1)

A similar U.K. review commissioned by the CVCP/HEFCE also throws doubt on the extent to which universities will become 100% virtual, but does conclude that "every institution will need to have some capability in that field and most courses will need, at least, to make use of the web as a resource base". (2)

And there is plenty of evidence that both traditional universities and non-traditional providers are adopting an incremental approach to going online, mapping out a future that has both "bricks and clicks" i.e., both physical and virtual campuses, and pursuing partnerships to bring together multiple strengths.

These moves can be seen as a response to the highly competitive market place in which universities find themselves.

There are many drivers for this changing environment and it is worth examining some of these in greater detail to better understand just what is happening.

DRIVERS FOR CHANGE

> "Higher education around the world must undergo a dramatic makeover if it expects to educate a workforce in profound transformation." (3)

These are the words of George Klor de Alva, President of the University of Phoenix, the largest accredited for-profit university in the United States.

That the University of Phoenix has been relatively successful (with the world's largest completely online, full time degree seeking student body) is a reflection of that institution's philosophy that education today must be "ubiquitous, continuous, consumer-driven, concerned with quality assurance and outcomes oriented." (4)

Such a philosophy has been shaped by the many factors that are fuelling the growth of non-traditional providers as well as driving major changes in the ways in which traditional universities fulfil their teaching role.

These factors include:

- the globalisation of economies and the need for the continuous retraining of the workforce
- the development of the Information Age with its attendant knowledge explosion, resulting in an emphasis on learning how to learn and lifelong or perpetual learning
- the tendency for governments in many countries to see further education as a private good to be funded on user-pays principles
- the demands for greater access to tertiary education with more flexibility and convenience in attendance, time and place of study entry requirements and learning pathways, and progression
- the development of advanced communication and information technologies which make possible the development of more flexible virtual learning environments.

STUDENT-CENTRED LEARNING

As well as the drivers listed above, there are changing notions of what it means to learn. Universities are moving from a teacher-expert paradigm to a student-centred one.

Cognitive sciences research and social educational theory have emphasised the complex and idiosyncratic nature of learning and the part played by personal, social, cultural and political contexts.

The adoption of the "constructivist" framework, developed and largely influenced by science teaching, is based on a premise that knowledge and understanding is individually constructed.(5) Learning is the result of active reflection by the learner and integration of new information into existing concepts and frameworks.

In addition to changing ideas about the psychology of learning, researchers have also investigated different approaches to learning used by students. Two distinct approaches have been identified, with the adoption of one or the other being a function of teaching and assessment strategies. Students can thus be influenced to use a deep or surface approach. The former is characterised by looking for meaning in order to understand, while those students using the latter seek to memorise information.

Given the demonstrated relationship between the approach adopted and learning outcome, with deep learning associated with high quality outcomes(6), higher education institutions are increasingly emphasising teaching and learning strategies that foster deep approaches.

Students' own views of what constitutes "good" teaching and "good" courses reinforce the need to focus

on deep learning approaches. Ramsden(7) describes "good courses" from the students' perspective as those which:

- make it clear what you have to learn;
- get you interested and active;
- provide the right balance of freedom and control;
- give you plenty of feedback;
- assess understanding, as well as recall.

TECHNOLOGY – THE ENABLER

It is the interactive and distributive characteristics of the Internet and telecommunication technologies that enable the virtual university to address the needs for flexible, lifelong learning and learner centredness.

For example, technologies that enable the broadcasting of information to students independent of time and place provide:

- greater opportunities for individuals living outside urban areas to participate in tertiary education. This is a particularly relevant point in the Australian context, given the decline in rural economies and the "tyranny of distance".
- individuals with busy professional lives and/or family commitments with the means to balance these demands against their need for ongoing professional development or re-skilling in the case of company restructuring or downsizing.
- the means by which learning is integrated with work for those individuals, organisations, communities and societies that recognise learning as a source of competitive advantage. Learning is increasingly being integrated with work and occurring whenever and wherever it is required.

The WWW, satellite broadcasts, wireless technologies and computer based learning packages are all examples of technologies which facilitate the tertiary education sector's efforts to meet society's expectations for greater flexibility in the learning experience and removal of existing geographical barriers to participation in learning. Developing technologies such as wearable computers and wireless networking will offer even greater flexibility in the future.

Deep learning with active engagement of the student as already described is enhanced through problem-based and collaborative learning approaches. Computer-based and interactive multimedia technologies, either standalone or networked, and mixed media packages provide opportunities for these approaches with the focus of interaction between the learner and the program. Teleconferencing, videoconferencing, computer-based interactive multimedia packages and various forms of computer mediated communication are technologies that facilitate synchronous delivery of content and real-time interaction between teacher and students as well as opportunities for problem-solving either individually or as a team.

Similarly, technology can enable students to customise learning content, process and outcomes to suit their individual learning styles and preferences. Computer-based interactive multimedia packages are just one example of a technology which offers content in a variety of formats, e.g. sound, graphic, video.

In the future, technological innovations such as 3 dimensional spaces and animated pedagogical agents, for example avatars, will facilitate the learning process. These animated agents, that build on previous research on intelligent tutoring systems, will provide greater opportunities for interaction between students and teachers, personalisation of the learning process and collaborative activities. Through the use of interactive simulation exercises, students are able to develop their problem-solving skills in 'real-life' situations.

A "VIRTUAL" REALITY CHECK

There is a lot of hype associated with the notion of the virtual campus and we would do well to examine

just what impact virtuality is having on teaching and learning activities.

Cost
First some comments about cost:
The decision by a university to go virtual should reflect strategies to extend markets or enhance the learning experience rather than a desire to reduce costs.

While some governments and some university managements may still believe that online teaching can reduce institutional costs, the evidence is to the contrary. All the organisations studied in *"The Business of Borderless Education"* report high costs of developing and delivering technology – mediated content.(8)

The "for-profit" institutions such as the University of Phoenix are not using online education to drive down costs but are achieving their cost efficiencies through the disaggregation or unbundling of the teaching process. Different groups are contracted for their expertise in parts of the process e.g., curriculum design, teaching, assessment, delivery, support. Costs are also reduced through a focus on teaching only and the exclusion of research and community service activities. The teaching-research nexus is gone with no direct relationship between research and the curriculum.

Non-traditional providers also focus on specific target client groups and tend to offer a relatively limited range of courses.

Implications for traditional notions of academic work
The virtual campus, when grounded in a learner-centred paradigm, challenges the traditional notions of academic work. The learner is no longer seen as passive but active. The academic's role changes from oracle to mentor and in the online environment, a team approach is the norm.

Many teachers may need to change their conception of teaching to be able to design effective learning experiences for their students in the virtual campus. The importance of such changing conceptions was emphasised in Alexander's (9) evaluation of over one hundred projects involving the use of information technology in teaching. Alexander's study found that the use of technology did not in itself result in improvements in the quality of learning but that success depended on the design of the whole learning experience. Academic development programs are needed to encourage teachers to focus not only on changing content and adopting new teaching strategies, but to also adopt an ongoing, reflective approach to student learning.

Accreditation and quality assurance issues
There are a number of significant impediments to operating the virtual campus, whether as a traditional or non-traditional provider.

These include:

- verifying student identity, particularly for the purposes of assessment
- ensuring adequate and equitable student access to IT infrastructure and support
- providing all necessary online information and library resources electronically
- helping students develop the necessary independent learning skills required in the online education world

When the virtual campus is seen as the means of extending an institution's market globally, further issues need to be added to the list, such as:-

- difficulties in working across different time zones and in many languages
- the need for local content in online courses
- the need to accommodate cultural differences in learning styles
- local accreditation requirements and government policies

Legislative and policy issues

When operating in virtual mode, a number of legislative and policy barriers are likely to be encountered. Certainly in many traditional universities, intellectual property policies are having to be revisited. Attention must also be paid to copyright requirements and, in Australia at least, the regulatory environment for telecommunications continues to change.

CONCLUSION

The ultimate determinant of the success of the virtual campus will rest with the student. Certainly many students place a premium on the sort of flexibility and convenience that the virtual campus can deliver. However, Smith (10) has found that, in Australia at least, many students have a degree of resistance to virtual courses. For many students, school leavers in particular, the social dimension of the on-campus experience continues to be important.

It is predicted that the best competitive advantage will be afforded to those brand name institutions that offer both virtual and on-campus experiences. As quoted in the Cunningham report, students want "the high touch as well as the high tech". (11)

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List of Acronyms

CVCP – Committee of Vice-Chancellors and Principles of the Universities of the United Kingdom

HEFCE – Higher Education Funding Council for England

USQ Online - University of Southern Queensland Online

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IATUL

STRATEGIES FOR WORKING WITH LIBRARY STAFF MEMBERS IN EMBRACING CHANGE CAUSED BY LIBRARY AUTOMATION

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This paper assumes that the academic library world is in a state of profound and continuous change. The reasons can be summed up in the phrase – the convergence of information technology and communications. The purpose of this paper is to share with you some personal observations on some common "pitfalls" that we library managers make as change agents. I will then offer some simple strategies for working with library staff members in embracing change caused by library automation.

Library Automation has two major objectives:

1. To improve access to information,
2. To decrease, or at least not increase cost, by transferring low-level, repetitive operations to a machine.

For the purpose of this discussion, library systems include these operations:

1. Acquisitions: identifying, ordering, receiving and paying for library materials,
2. Cataloguing: arranging like materials together by subject and providing access to them by indexes: author, title, subject, etc.,
3. Circulation: making materials available to users by lending,
4. Reference or information service.

One may automate all or any part of these operations. The four operations of acquisitions, cataloguing (bibliographic data management), circulation, and reference fall into two basic categories: information management and information retrieval.

Information management
The materials acquisitions function involves creating an order for an item, say, for example a book; thus eliminating the multiple-part paper filing operation for each book. The computer is able to perform more efficiently large numbers of clerical operations in the order process. The cataloguing process was one of the first beneficiaries of automation. Off line batch bibliographic searching and computer produced microfilm catalogues and indexes to bibliographic data have been available for several decades. The real advantage to cataloguing departments has been realised m.. e recently however, through "file transfer" whereby entire files of information are moved between computer systems by telecommunications. File Transfer has significant implications for libraries. Participants in File Transfer projects have demonstrated the feasibility of intercommunication standards to support the electronic interchange of bibliographic records. The protocol based on the Open System Interconnection (OSI) reference model, enables libraries to search and transfer catalogue records by means of connection oriented, computer-to-computer links. This can occur despite the fact that institutions operate different makes of computers. The file transfer protocol considerably reduces both the amount of data entry required to create a local cataloguing record and the turnaround time needed to obtain source records. The time required for obtaining source records has been reduced from weeks to hours. To accommodate this quick turnaround, changes had to be made in Waterloo's Cataloguing Department workflow. This was obviously a change from more traditional cataloguing practices. These changes were not introduced without planning.

The card catalogue, first introduced over a hundred years ago, was a remarkable information storage and retrieval device. It provided random access to massive quantities of data. However, it was expensive to maintain, and unresponsive to users changing needs. Users now have access to data on a library's collection from computer terminals located in the library, at home or in their offices, anytime. Microcomputer owners with a modem are able to access the catalogues not only of their local libraries but also the collective catalogues of major libraries elsewhere. One can find out whether a local library holds a book, and if it is in; if it is not, a 'hold' can be placed, and in certain circumstances it can be delivered to the user. If the local library does not hold the item, distant catalogues may be searched and the inter-library loan systems will allow one to order the book to be sent to his local library. The user interacts with the computer to obtain necessary information. It is this interaction between the user and the computer system that really sets apart the online catalogue from other forms of catalogues (book, card, etc.). Using the capabilities of the computer, the user is able to retrieve and manipulate large amounts of information. A well-designed online catalogue can even provide assistance in case a user encounters a problem or desires an explanation. The Online Catalogue has made this change possible. These changes have a profound effect on library staff. Conversion to the online catalogue provides unprecedented convenience, efficiency and effectiveness to library users.

Having found the book through the catalogue, the third automated function is called into action when the user borrows a book from the Library through the automated online circulation system. To "sign out" a book one passes a light pen over the user's card and over the bar code label in the book. The system then combines the two pieces of information and stores it until the book is returned when the book bar code is "wanded" again and the book is discharged and returned to the stacks for the next borrower. No paper is created or filed. The computer prepares all user statistics and overdue notices.

The fourth function of library automation is reference or information retrieval. As well as information retrieval from the online catalogue there is the capability of retrieving information from other data banks and web sites through computerised literature searches quickly, online, by search terms or subject headings. Such service covers the broad subject fields of science, technology, medicine, social sciences and business/economics. Through plain language search terms one may access information in such fugitive literature as technical reports and conference proceedings as well as the periodical literature. Hours of searching through paper indexes can be reduced to a few minutes of computer searching. These automated applications have changed the nature and scope of library work. The introduction of the WorldWideWeb has accelerated the enormous changes that are occurring in academic libraries today.

A 'library system," whether or not it is automated is an organised set of activities, tasks or operations performed on information or operations to achieve a specified result. In a manual library system people required process operations. If a computer performs some of the work, a computer based library system results. In today's automated library systems, computers assist people. Librarians and library staff are capable of achieving more, less expensively, more accurately and more rapidly than by manual methods.

Automation has implications for the management and development of library human resources, and it is these implications and the question of managing change in general that I should like to focus on. As library managers, we cannot ignore the interrelationship between implicit human values and automation. The introduction of computer library systems causes change: technological, organisational and most importantly, social. The introduction of technology to library services causes the relationships between library staff and their work to change.

Traditional technology, for example, the typewriter and the photocopier, extends the power of human muscles and senses. Contemporary communications and computing technologies, particularly when they are combined more closely resemble an extension of the human nervous system. Their influences are more profound and unpredictable.

The challenge to supervisors and managers is not to master the functional details of automation. The proof of our ability to manage will be to design appropriate organisational structures to operate effectively when automated systems are introduced. The social and organisational considerations are far more important than the technical ones. Experience has taught that there will be resistance to change.

We cannot ignore this resistance or treat it as a problem separate from the introduction of change. It is *part* of the change process; it must be anticipated and planned for.

The causes for resistance are rarely obvious, even sometimes to those who are doing the resisting. Let me suggest a few: There is **uncertainty**, usually because managers did not make clear the purpose of the program. You might hear something like,."I hear that we are being replaced by machines". Then there is **cynicism**, "or this will never work." This can be a self-fulfilling prophecy which, if we let it, and can lead to "I told you it wouldn't work". And there is either **resignation or hope**, "I give in" or "This isn't so bad after all". The simplest and quickest way to get to this stage is through consultation and communication. I believe that people who are consulted from the very beginning, participate in the processes and understand the reasons for change, are more likely to accept the change than those who have change dumped on them.

Let us list some of the **common pitfalls** that interfere with the change process.

1. Poor communication between management, staff and the change agents
Without careful explanation staff may misinterpret the reasons for the introduction of a new system and improperly evaluate its benefits. Poor communication will turn people off, cause worry, and convert potential advocates into opponents.

2. Unanticipated technical problems associated with the change
Technical problems can arise if there are no manuals, if forms are badly designed or if the systems software still has 'bugs' in it. Even if we provide all of these things, technical problems can still arise.

3. Fear of the unknown, uncertainty, task enlargement or reduction
The introduction of a new system often demands a redefinition of duties and responsibilities. Departmental relations may change. Personal and procedural interdependencies must be considered in systems design. Fear of personal failure resulting from a perceived inability to cope with the intricacies of new procedures can contribute to a climate of resistance. Most people really do enjoy their work. Often the purpose of an activity is of less interest to the person performing it than is the ritual of its performance. If the work to be done is "de-skilled" by the computer or does not provide for the exercise of individual judgement, people will create the opportunity to use their judgement in an operation even when it is not required.
Supervisors and middle managers are typically the most neglected group in the change process. The question uppermost in their minds is "what happens to my job when the people I supervise are using new technology." Human relations may deteriorate and the change may contribute to an environment of hostility, increased absenteeism, and failures to meet deadlines and staff complaints about the quality of the air, washrooms, staff lounge, cafeteria, parking, etc. Those elements from which staff derive satisfaction should be preserved, whenever possible. If they are not, people will reject a task that causes stress. People may develop hostility towards themselves or others leading to confrontation with supervisors, peers and subordinates. This can lead to a deterioration of interpersonal relationships, morale and service.

4. The failure of the new system to meet stated **management objectives** such as improved job satisfaction or efficiency Staff may identify inadequacies in the new system before management does and reject it because it does not serve the organisation's stated objectives. Management is receiving a strong signal in this case that the new system should be reviewed. If the signal is unacknowledged, staff may change their internal motivational aspirations and attitudes. A manager at Waterloo recently asked about a new system being introduced campus-wide, "When will we have a system that works for us instead of getting to systems to work for?"

5. Finally, management's **failure to understand, anticipate and prepare for resistance**
Time and training must be committed. Communication takes time. Management can contribute to the failure of a new system by not providing appropriate support through such things as training, compensation, equipment and furnishings. Resistance to change must be addressed by focusing on the sources of the problem rather than the symptoms. Dealing directly with, hostility, production bottlenecks, or data entry errors will have no permanent, desirable effects. Managers will have greater

success if they have in place specific strategies for managing change.

Some of these strategies for managing change are:

1. Understand the objectives of the proposed change.
Gather all the necessary information associated with the change and understand the problem being addressed. Reduce it to the basic principle: to automate is not an objective; to give better service is.

2. Identify and communicate the deficiencies of the existing system.
Problem identification and thoughtful consideration of solution alternatives are prerequisites to successful change. For example, the necessity for change might be promoted by asking staff to review and analyse current practice. In the classical systems analysis procedure one would:

- Analyse current operations
- Describe the ideal
- Evaluate current practice
- Develop plan for change

Do not define the 'problem' in terms of the preferred solution. A review and analysis develops a perceived need for change. This need is reinforced by discussions showing how the new system will solve problems.

3. Demonstrate how the change will improve the quality of the work performed and/or increase staff efficiency.
Work may become rewarding by simplifying or eliminating tedious tasks. The new system may eliminate bottlenecks. It may provide more relevant and timely information leading to improved performance and service. We are trying to communicate change in a way that staff will see it as a positive thing for both the library and themselves. There is a flaw in this reasoning of course; many staff will see this quest for work-place efficiency as leading to job loss. We must have this discussion in the open.
The change effort should be perceived as being as staff-motivated and as voluntary as possible. If this is ignored a variety of problems can be expected regardless of the technical soundness of the change. It is not possible to predict the complex and subtle consequences of even the simplest changes. It is essential that we enlist the problem solving ability of those directly affected by the new system.

4. Establish and maintain open channels of communication among managers, consultants, vendors, systems installation personnel and staff. This is time consuming and a common mistake that managers make, is to move too quickly and involve too few people. Adequate time must be allowed for the transition process. Communication should include the clear articulation of management's objectives and commitment to the project. To communicate effectively we must not only convey information clearly and honestly. We also must listen well and respond sensitively to matters of concern. Participation and support are part of the communications process.

5. Encourage and use employee participation in all phases of the change process. Managers need to ensure that employees not only understand the scope and technical details of their new tasks. They must also perceive their new duties, status and relationships as being at least equivalent to those which existed under the old system. It might be desirable for some time to operate the new system in tandem with the old system. A selected group may begin operating the new system under close supervision of the systems technicians and managers. As this group gains competence and confidence, they can gradually engage the services of other employees and eventually phase out the old system. In addition, training manuals, programs, user manuals, and observations of similar systems in other libraries will prove useful in successful change. Accurate and complete information will help reduce much of the anxiety associated with change.

6. Commit the resources of the library to the change; provide staff with a supportive environment and promote the change at all levels. The issues of recruitment, training, compensation and ergonomics are significant.

a) Beginning with recruitment, there will continue to be a growing emphasis on the importance of qualifications that will include familiarity with current technology, and a willingness to work in rapidly changing and highly automated environments. Basic requirements for entry-level jobs reflect the needs of an automated environment. So too, do the criteria for promotion.

b) Technological developments also affect existing workloads and staffing requirements, and place greater demands on the knowledge and skills of staff, giving rise to increased training needs. Large numbers of staff require training and re-training, specifically, to teach procedures and generally to enable them to understand and feel comfortable in an automated environment at various stages in their careers. New or reallocated resources will be required for job-related training, staff development and continuing education in order:

- to establish a basic understanding among all staff of issues in the advancement of technology, and especially to increase their knowledge of computer technology;
- to increase the confidence and competence of staff whose jobs are directly affected by technological developments
- to explore new ways in which technology might be made to improve staff efficiency and effectiveness,
- to restructure and redesign jobs and to improve management decisions.

c) Uppermost among our responsibilities as managers is to foster and nurture an environment in which well-trained and willing staff are motivated to participate in the library's development; an environment in which their commitment is acknowledged by an appropriate reward system. Many of us are frustrated by circumstances where financial reward is limited by an organisational salary administration program which, in turn, is limited by governmental funding. However, of equal importance to strictly monetary considerations are those of career development possibilities. The availability of career paths to provide opportunities for mobility and advancement within the organisation is also important to staff.

d) Among the questions that technological advances raise are those described as "ergonomic": questions having to do with the biological, medical, psychological interface between people and machines. Automation must be attended by a continuing organisational commitment to the health and safety of staff. Existing facilities and equipment must often be modified and the design of additional facilities undertaken from a somewhat different perspective. Ensuring a safe and ergonomically sound working environment must be a continuing organisational, departmental and individual priority.

Summary

We must apply these strategies for managing change in an open, supportive environment where implementation is enthusiastically promoted at all levels. The environment into which we introduce automated systems is as important as the mechanical and technical details. The effectiveness of automated library systems will be determined by the degree to which those who must interact with them accept them. We must obtain the active and enthusiastic participation in the planning and implementation, of those people who will be most affected by the resulting change, is paramount.

Education and orientation are important factors in implementing automation. All staff from professionals through support staff, and most importantly, front line public services staff, must trained in basic computer technology. They must know what a system can and cannot do, and how to deal with its limitations. A basic understanding and a little practical knowledge of how a computer works goes a long way to dispel the notion that a computer is an intelligent, cognitive machine.

Computers do not do anything that people have not programmed them to do. People control computers; people can override computers; people can pull the plug on computers; people can personalise and individualise a system. People can also discredit a system by giving up the power of control over the computer and in blaming the computer for not being flexible enough. Systems must be designed with as much flexibility as possible. It must also be possible to override a system to make exceptions through human intervention. Flexible systems may cost more, but inflexible systems cannot handle the individual requests that are a large part of library service. Greater flexibility can be built into a library

system and enhance the function of a library. Developers of a library system control that flexibility through commitment, planning and education.

Anticipating and responding to technological change often leads to functional reorganisation and the possible reallocation of human resources. Such reorganisations, where necessary, must be thoughtfully planned and carefully implemented to recognise and respect human values while supporting the goals of the library.

There are complex sets of interpersonal relationships affected by a systems change. The people responsible for making the change must be sensitive to these relationships. As library managers, we have a vital role to play in piloting our organisations through the stress of complex change.

There are two ways to bring in technology: short/long and long/short -- both take the same time – second is more fun!

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IATUL

From bricks to clicks: unified campus delivery systems futures

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ABSTRACT

This paper will review future trends in information provision and examine the nature of a twenty-first century campus environment in Australia. Issues to be addressed will be the dimensions of the print/digital divide, the physical and virtual settings for the academic environment and the information competencies required for staff and students. New models of management and organisational structures will be explored in the virtual provision of information access.

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IATUL

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IATUL

INFORMATION LITERACY - COLLABORATION BETWEEN THE UNIVERSITY OF PRETORIA AND THE POTCHEFSTROOM UNIVERSITY FOR CHRISTIAN HIGHER EDUCATION

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Over the last decade, the university of Pretoria has changed in terms of its student profile and policies. From having been a "Whites only " institution, with tuition in Afrikaans, it is now a multiracial, (with a significant proportion of the students being black) multicultural institution where most courses are offered in English **and** Afrikaans. The changing profile of the student body has resulted in a number of vital changes in attitude and approach, as well a growing understanding that there are a number of issues that need to be addressed to enable the students to benefit fully from their university education. One of the issues that is addressed is that of information literacy.

Another factor that has influenced the change that occurred was that the students from disadvantaged backgrounds very often had had little or no exposure to books, let alone libraries. Combined with poor basic education and the fact that most study in English and not their mother tongue, these students face enormous obstacles. These same students are further disadvantaged in that the schools they attended have very few computer facilities and many do not even have electricity. They are faced with the enormous task of catching-up. This places additional pressure on the students, who are generally very stressed. Many have enormous logistical problems of getting to and from the university every day, others have extremely unreliable sources of funding and many are on budgets so tight that any unforeseen expenses cripple them. They also do not have study facilities at home, as many share sleeping and living arrangements with many other people, very often not members of their own families.

Nonetheless, the University has recognised that all its graduates should be computer literate and that information literacy skills are vital and to this end have embarked on a formal programme called Computer and Information Literacy (CIL)

Previously there have been various initiatives by the Academic Information Service (Library) at the University of Pretoria, to promote information literacy, but none which addressed the issue on a university-wide basis. Most attempts were ad-hoc, and driven by the librarians for specific disciplines, usually on the request of the academics concerned., the consequence being that the students' exposure was very largely dependent on the enthusiasm of the academics ad the librarians concerned. The main problem with implementing a campus-wide information literacy programme was logistical. There are 26000 students at the university, 19000 of whom are undergraduates. The Library cannot be expected to teach such a course to that many students, nor could the Department of Information Science be expected to cope.

In 1998, with the recognition of the growing need for computer literacy, a decision was taken by the University of Pretoria to implement a campus-wide information literacy programme. Damelin Computer School was approached by the University to assist in the teaching of computer skills to undergraduate students. They were approached as they specialise in computer literacy, and therefore were in a better position to teach the great numbers of undergraduates who require such training, and it was decided to include information literacy programme in the curriculum that Damelin Computer School would teach.

Damelin Computer School is a private organisation the teaches basic computer skills. It was decided to

use their services as the level of tuition required for the computer courses did not justify the use of university academics.

Three computer skills courses were developed, the first being an introduction to computers, the second dealing with word processing using MS Word and the covering the database and spread sheet software of Microsoft Excel and Access. At the time it was decided that an information literacy component should also be introduced, and is now offered as the fourth component of the Damelin courses.

There was customised course material available for the first three courses, which the University of Pretoria got permission to use, but for the Information Literacy, (CIL 174) no course material had been developed.

The Department of information Science was given the task of producing the material. A collaborative effort was implemented, with the Departments of Information Science, Informatics and Computer Science as well as the Academic Information Service being involved in the development of the course.

The brief was that it would be a 12 hour course (six two-hour sessions to be taken over six weeks) and which would be taught by the Damelin Computer School trainers during the fourth quarter. The course was to be more than a user education course that would restrict them to being able to use the Academic Information Service and not other libraries or databases. It was to be a mainly practical course, but with a theory component so that the skills that the students acquired would be well grounded, and thus transferable.

The information literacy definition that was used was that of the American Library Association Presidential Committee on Information Literacy, 1989 which is as follows:

> 'To be information literate, a person must be able to recognise when information is needed and have the ability to locate, evaluate and use effectively the information needed. Ultimately information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organised, how to find information, and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning because they can always find the information needed for any task or decision at hand'.

The difficulty comes in including an evaluation component idea was also that the students would be taught not only to retrieve information, but also to evaluate it, so an evaluation component was included in the course. The ideal here would be to get the academics involved, so that discipline-specific material evaluation can be included. To this end there is a concerted campaign to ensure that information literacy becomes and "add-in" and not an "add-on" in all teaching departments.

The course is aimed at undergraduate students who complete the unit in either their first or second year and as such the coverage of material is not done in great depth but rather is generic, with the option of offering more specialised courses later. Also as there are students from many different disciplines doing the course, the material has to be generic, but with subject specific databases being introduced once the basic information skill shave been mastered.

The course material is presented in a book that the students have to purchase. They attend lectures where the theory and the practical material is covered To this end, all students are introduced to information retrieval on the AIS catalogue UpexPlore which is an Innopac product, and the Dialog version of ERIC, where they use the command language to retrieve their information, as well as various SilverPlatter products such as Social Sciences Index, UMI (ABI/Inform) and JutaStat for South African legal information. The students are all trained on UPexPlore and ERIC and then may select the databases that are appropriate for their own disciplines.

The course consists of 6 sections:

Section A Information

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Section B               Finding Information
Section C               Computerised Databases
Section D               Search Strategies
Section E               Internet
Section F               Evaluation
Section G               Practical Database Searching
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Evaluation
As there are in the region of 1900 students registered for the course annually, it was decided that evaluation should be electronic. The theory component is covered by multiple choice, matching concepts and definitions and true/false questions, all of which should require more than simple guesswork. The workstations can be configured so that the student has to conduct a search before the items for selection are displayed, thus ensuring that they have at least mastered some information retrieval skills.

The CIL course had been made compulsory for many courses but students who are already computer literate may write an exemption examination so that their time may be spent more productively. and more attention can be paid to those students who really need assistance.

Internet access
A cause for concern has been the problem of Internet access. The students are required to learn to use the Internet effectively, but Damelin could not get their Internet connection to support all the computers in the school. This meant that the students had demonstrations and no hands-on Internet searching. This is a matter that will need to be addressed before the next course is offered.

Evaluation of retrieved material
Having completed one term, a number of problems have arisen, which has resulted in the complete reformulation of the course material using the Big6 as a framework. This arose out of the collaboration with the PU for CHO. The librarian responsible for user education there has developed training material and a number of computer assisted instruction packages that are designed to reinforce skills. There was a two-day workshop in which the material was merged, then re-evaluated and re-formulated in accordance with the Big6. The PU for CHO has a similar problem in term of their changing students body, and were very happy to so-operate with the University of Pretoria and to combine expertise rather than to "go it alone" The existing course material will be adapted to meet the requirements of both institutions with institution specific material as well. A computer assisted instruction package to supplement the course material will be developed and the course will be offered in the second semester. The main headings of the Big6™ are:

1. Task Definition
2. Information Seeking Strategies
3. Location and Access
4. Use of Information
5. Synthesis
6. Evaluation

Most of the course will be focussed (for the time being) on units 1-3, because until we get the teaching staff involved in the courses, we are not in a position to cover units 4, 5 and 6 in anything approximating the depth that we would like.

Feedback
There has been some feedback from the students who have indicated that this course material is very useful. One student said Athe more I use it the more valuable it is.

Having taught information retrieval to second year information science students who have completed the CIL courses, but more significantly CIL 174, the progress is obvious. The students come in with more of an idea of what information retrieval is about and how to use information effectively, which makes the Information retrieval course much more accessible.

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Trainers
The trainers are Damelin employees, who teach the computer skills courses and the Microsoft applications. They were given a weeks training in the CIL 174 course material, which with hindsight was probably not enough. We envisage using trainers with a background in LIS in future, in order to enhance the quality of the training.

Conclusion
Owing to the time constraints this course cannot be a detailed course, but is does provide an introduction to the topic and the hope is that the students will follow up with more subject related searching, as their course work requires it. Remembering that becoming information literate is a process and not an event and bearing in mind that the skills are aimed a lifelong learning; the students are only given a glimpse of the possibilities.

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IATUL

INFORMATION LITERACY IN ELECTRONIC ENVIRONMENTS FANTASIES, FACTS, AND FUTURES

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Introduction

In recent years, librarians, and particularly librarians in academic institutions, have invested considerable interest, energy and program development centring on information literacy. The complexity of this area is acknowledged: the multidimensional nature of the collective consciousness of information literacy; the variety of philosophical assumptions underpinning different conceptions of information literacy; the multidisciplinary contexts in which information literacy research is situated; the different professional approaches to the implementation and evaluation of information literacy initiatives; and indeed, the range of perceptions related to the why information literacy initiatives are indeed worthwhile,. Central to the collective consciousness are concepts such as lifelong learning, independent learning, learning needs, information overload, and information rich, concepts that are central in the advocacy role that librarians, as chief protagonists, are playing in the information literacy agenda. The clarion call to information literacy has been heightened by developments in access to networked information technology, and the shift from a paper-based to a digital information environment. The development of the "digital library" or "virtual library" in particular has created an information environment that is complex and fluid, connective and interactive, and diverse and unpredictable, and where the professional provision of information is no longer constrained by time and place. It is becoming increasingly clear that information technology and the development and management of digital collections and information services is challenging and reshaping the way libraries do almost everything they do, and this has major implications for information literacy initiatives.

Virtual libraries and information literacy

Given that the theme of this conference is "Virtual Libraries: Virtual Communities", this paper focuses on the concept and practice of information literacy in relation to the virtual information environment. The concept of a "virtual library" is not merely equivalent to a digitised collection with information management tools. Rather, it is the creation of a holistic information environment that brings together "collections, services, and people in support of the full life cycle of creation, dissemination, use, and preservation of data, information, and knowledge". Lucier, Founding University Librarian and Exectuive Director of the University of California Digital Library asserts that "What is critical with the digital library is to look at what people's information needs are, and how we might use technology in order to solve those problems". Dempsey Director of the UK Office for Library and Information Networking provides four key challenges for the development of digital information services:

- *The challenge of the serving the active user:* Users want "resources bundled in terms of their own interests and needs, not determined by the constraints of media, the capabilities of the supplier, or by arbitrary historical practices";
- *The challenge of living with the radically new:* "...Fluidity replaces fixity as a dominant characteristic of resource creation and use. [Data] can be shared, reused, analysed; can be adapted, reconfigured, copied and newly combined in ways which were not possible before";
- *The challenge of planning for the radically unpredictable:* "Not only is change rapid, it is

unpredictable."

- *The challenge of institution building:* "...we are only beginning to sense how institutions will be built and modified in digital spaces.

Dempsey challenges librarians to critically examine their roles and practices in order to address these challenges. A critical challenge centres on information literacy. Bruce argues that information literacy is "an appreciation of the complex ways of interacting with information. It is a way of thinking and reasoning about aspects of subject matter" Todd1 identifies three fundamental components of information literacy, each centring on a range of commonly accepted elements:

- *Connecting with the world of information:* understanding the real need; identifying and defining what needs to be known, creating approaches to meeting those needs; planning and developing search terms and search strategies, understanding the structure of the information base such as a catalogue, index, database, or web; implementing searching strategies to interrogate both sources and resources; operating the information technology appropriately; manipulating information objects such as books, files, fiche appropriately, compiling a hit list of located sources.

- *Interacting with the world of information:* knowing the indicators of quality information, questioning the relevance of the located resources, challenging, confirming or disconfirming the validity of the information, evaluating the appropriateness of the sources, filtering out unsuitable information, dealing with the threat of information overload, analysing the information to identify important and needed components, interpreting the information against frames of reference, understanding the ideas, organising the salient ideas into some meaningful structure to create a synthesis, critiqueing multiple viewpoints and opposing ideas, reflecting on and evaluating the information process and the information product; working with information confidently, ethically, and methodically, being self motivated and venturesome, being goal oriented.

- *Utilising the world of information:* constructing new sense; getting direction; seeing the way ahead; taking action; applying the information to construct an answer to the question, solving the gap in previous understanding, finding help, getting direction and being able to move on, creating an information product, making decisions and implementing solutions, developing new applications.

Against this backdrop, a key implication for the provision of virtual networked information services is to ensure users' engagement with this rich information environment is active, purposeful, and satisfying. To date some significant research is emerging that is focusing on people's interactions with digital information, and key implications for the development of information literacy are emerging. On the one hand, there is a conception that people, especially young people in particular are gurus in this vast digital world yet on the other, emerging research evidence is clearly suggesting that the intuitiveness, ease, certainty, and success as input and outcome attributes of searching the World Wide Web are highly questionable. This research, primarily American, provides insights into the cognitions, behaviours and emotions that are commonly experienced during the process of interacting with electronic information, particularly the World Wide Web. Kehoe claims "Turning information into knowledge is the most intellectually challenging, time-consuming, and potentially controversial process. An information flood does not necessarily mean that people become informed". The following research evidence, based on samples of primary school students through to students in tertiary education, highlights significant dilemmas in connecting with, interacting with, and utilising Web-based information.

INFORMATION LITERACY DIMENSION	RESEARCH FINDINGS
Connecting with information	Aitkin ; Watson ,: high levels of information overload; inability to manage and reduce large volumes of information; Bilal & Watson ; McNicholas & Todd ; Todd : failure to retrieve documents based on aboutness; formulating ineffective search queries; failure to utilise Boolean operators Kuhlthau ; McNicholas & Todd 11; Watson 9: considerable insecurity and uncertainty when searching; McNicholas & Todd 11; Kafai & Bates 14: problems with working with search engines Hertzberg & Rudner 15; Nims & Rich 16: tendency to conduct simple searches, crafting poor searches; considerable guessing of appropriate terms; Nims & Rich 16: high expectation of the technology's ability to make up for poor searing techniques Fidel 17: examine only first screens of most sites Schacter, Hung & Dorr 18: preferred browsing techniques to systematic, analytic-based strategies; Hirsh 19: motivation for searching decreases when site load time is slow, and especially in relation to graphics – technical implications
Interacting with information	Aitkin8: coping strategies – filtering, simplification, errors, delegating; feelings of confusion and frustration; Bilal & Watson 10; Hirsh,19: not thinking critically and evaluatively in searching; limited use of thesaurus Hertzberg & Rudner 15: typical user only performs 2 or 3 inquiries per search; very small number of citations examined (5-6); abort searches quickly; McNicholas & Todd 11; Schacter, Hung & Dorr 18; Hirsh 19: inability to judge quality of information Watson 9: inability to question the accuracy of web information McNicholas & Todd 11; Wallace & Kuperman 20; Hirsh 19: not able to judge relevance of information; Fidel 17: often inappropriately favouring visual cues; minimalist behaviour – made quick decisions at all stages of search process; looked at pictures rather than textual information as signs of relevance; use of "landmarks" rather than indepth critical analysis of sites to judge relevance and quality
Utilising information	McNicholas & Todd 11: project management issues of time, workload management, meeting deadlines Hertzberg & Rudner 15: median amount of time spent in searching was 5-6 minutes; willing to construct answer on limited information; Users satisfied to utilise any somewhat-relevant hit McNicholas & Todd 11: tendency to plagairise

The development of the "digital library" or "virtual library", particularly with its emphasis on web-based connectivity and interactivity, has created an information environment that is complex and fluid, connective and interactive, and diverse and unpredictable. This selective review of some current research suggests that there are real dilemmas related to connecting to, interacting with, and utilising this information world. The identification of these very dilemmas provide substantial direction for

information literacy initiatives on which libraries might focus. Focusing on enabling library users to actively engage with ease in this complex, dynamically changing information environment should be a fundamental direction of information literacy initiatives. These directions, however, should not be built on a deficit or deficiency model of information literacy 1, where users are seen as deficient because they do not have such competencies; rather, they should be underpinned by a sense of empowering people to develop their full potential in solving their problems through effectively engaging with their information environments.

However, there are more complex issues involved in engaging in electronic information environments, which have implications for information literacy initiatives. I would suggest that one of these issues is the current practice of subject-based searching21. Historically, aboutness or topicality or keyword has been the most common starting point for information searching. Indeed, the notion of defining the information need, usually expressed as a content-rich topic, has been a fundamental process of traditional information literacy. This has generally worked successfully, primarily because the volume of resources retrieved in the past has been actually quite small, and because the quality of the resources has been prejudged by librarians and educators, thus not generally requiring users to engage in judgements of quality. Rather, in the past, the key judgement users have had to make has been that of judging the relevance of specific messages appropriate to the information need, and selecting those through an analysis process, and discarding the rest. The following table presents this model of searching in traditional print-based information 22 in the context of a student undertaking a research task:

Dimension	*Traditional (pre-www) information environments – eg libraries*	*Student responsibility*
Starting point of search	Subject / key word / aboutness / topicality	Key words primarily provided (in task documentation) rather than self-derived
Document scope	Limited number of information sources on topic; limited to single or multiple library collections	Use key world to search library databases or browse physical collection to retrieve limited set of documents
Document quality	Predetermined by librarians and educators; carefully chosen against documented selection criteria	Limited involvement: have not developed skills of judging the quality of document – recognise that this is done by librarians or educators, and is not required at a specific detailed level by students
Information relevance	Assumes students have clearly developed skills in identifying information messages relevant to topic; use only a limited retrieved set of documents to provide the information messages appropriate to task	Assumes students have an understanding of the criteria for judging the appropriateness / relevance of the information messages
Indicators of information quality	Generally clearly embedded in the resources: blurbs on authors, publisher's CIP data, introduction and preface	Assumes students are able to use these criteria in making decisions about quality and relevance of information
Information management	Low levels of overload, with uncertainty and lack of confidence minimised	Relies on effective note-taking and time management skills to reduce overload;

Research evidence, as presented in the summary presented earlier, indicates that aboutness or topicality

becomes problematic in Web-based searches, a problem that is illustrated simply by the very large number of documents retrieved on most topics through any one of the hundreds of search engines. Unlike the limited, carefully chosen, structured collections of libraries, the World Wide Web provides widespread accessibility to vast quantities of information; information whose content is uncontrolled, unfiltered, unorganised, and unclassified. The starting point of the search process becomes problematic, not just in terms of the sheer quantity and quality of web pages that are likely to be produced, but also in terms of the diversity of linguistic expression of the Web. It is also made even more complex because the search engines available all have different approaches to deciding what a document is about, that is, its aboutness. Approaches include: plain text searching, broad concepts and concept trees, cast-of-characters approach where key ideas, names and places are determined by frequency counts, and various thematic approaches. The outcome of a search is often high recall of supposedly relevant documents, and low precision of documents when the recalled list is examined and assessed against the information need. Once a document set has been retrieved, students have the task of searching through this huge base to identify relevant items. The complexities of judging both quality of web pages and relevance of information messages are overwhelming, creating an overload situation and associated feelings of anxiety and uncertainty. The problems are illustrated in the table below21:

Dimension	*Web-based information*	*Student responsibility*
Starting point of search	Subject / key word / aboutness / topicality problematic because of high retrieval rate	Need to consider implications of natural language searching and linguistic expression
Document scope	Large number of information sources on topic; not limited to single library collection	Need to construct search string to generate precise list; understanding of Boolean Operators; understanding of the scope of search engines
Document quality	Extremely variable – from high quality to poor quality on a range of quality criteria	Need to understand what constitutes "quality" information in a particular discipline; need guidance in identifying appropriate sources / places
Information relevance	Assumes students have clearly developed skills in identifying information messages relevant to topic; large sets of retrieved documents increases cognitive load required of this task	Assumes students have an understanding of the criteria for judging the appropriateness of the information messages
Indicators of information quality	Not clearly evident, and variably represented; some available through metadata specifications	Assumes students are able to identify on screen indicators of quality in making decisions about quality and relevance of information
Information management	High levels of overload, with uncertainty and lack of confidence increased	Creates problems in relation to time management skills to reduce overload; problems in relation to search management; creates environment for plagiarism

For example, consider the following History research task *"The concepts of land, kinship and culture sum up Koorie identity. Present an analysis and synthesis of evidence that argues this claim."* Searching Alta Vista on key words explicit or implicit in this task would generate large numbers of web pages. This is typically what happens. "Defining" skills of students would generate search terms such as "Koorie", "kinship", "Australian Aborigines", "land", "culture" without much effort. The following results were retrieved (1st July 2000): Land: 8,328,872 web pages; Culture: 6,806282, web pages; Koorie: 2,056 web pages; kinship: 54,250 web pages; Australian Aborigines: 7,762 web pages; land

rights: 25,063 pages.

Approaching the search by having students consider the place where quality information specific to the topic might be available, rather than subject, is likely to yield successful relevant searches quickly and easily. Rather than subjects, the following place search terms might be used to begin the search: Aboriginal & Torres Strait Islander Commission; Australian Institute of Aboriginal and Torres Strait Islander Studies (Canberra); Aboriginal Lands Group; Aboriginal Studies Press; and the Human Rights and Equal Opportunity Commission. Such an approach demands that students (and teachers) actually understand what constitutes "quality" information, and what might be quality places for the information. The dimension of "placeness", in addition to "aboutness" should become an important concept in defining stage of the search process. This is just one example that suggests we need to think more creatively and laterally as to how we might approach the resolution of the searching dilemmas users face through information literacy initiatives.

There are other significant implications for information literacy. Given the context of this conference is technological universities, and the specific focus is "virtual communities"; the development of these information and indeed critical literacies needs to be embedded more strongly in an understanding of the learning environment in which their development takes place. Having been involved in information literacy teaching and research for many years, I want to pose – gently – what I think is one of the key issues facing the effective information literacy development in the university environment. This issue centres on the effective development of instructional strategies focusing on information literacy. A significant work 22 I came across recently elaborated 10 key principles of shared learning, based on a synthesis of ongoing research about the nature of effective learning. These principles of shared learning provide directions for how information literacy initiatives might be successfully implemented.

Learning Principle	**Implications for Information Literacy Instruction**
1. Learning is about making and maintaining connections: linking concepts, ideas, meaning; linking mind and environment; linking self and others; linking deliberation and action.	Information literacy is all about enabling people making connections. Instruction should link needs to experience; Give learners responsibility for solving problems and resolving conflicts; Make explicit the relationships of need to the curriculum; Personalise interventions appropriate to learners' circumstances and needs
2. Learning is an active search for meaning by the learner: it is about constructing knowledge rather than passively receiving it; involving learners directly in discovery of knowledge; enabling them to transform prior knowledge and experience, and to take responsibility for learning	Maximise opportunities for student participation; Extension activities for growth and development; Provide meaningful experiences linked to curriculum, or life; Opportunities to critique process; reflect on outcome; identify needs; Opportunities for brainstorming and predicting solutions
3. Learning is developmental, a cumulative process involving whole person: Intellectual growth is gradual: advancement, consolidation, reinforcement; Integrated sense of identity	Progressive, developmental nature of each learning experience; Instruction should be additive and cumulative -> greater richness, complexity; Tracking student development of competence; Opportunities for trialing, testing, reviewing; Opportunities for needs assessment, discussion, reflection
4. Learning is both individual and social:	Peer tutoring and learning from each other;

Responsive to students' personal histories and common cultures; Opportunities for co-operative learning; Cultivating and inclusive community; Valuing human differences	Enable students from different cultural backgrounds to experience each other's traditions – choice of resources; Creative approaches responsive to different learning styles; Development of self-learning packages
5. Learning is strongly affected by educational climate in which it takes place: value academic and personal success and intellectual inquiry; involve all constituents in contributing to effective student learning feeling connected, cared for and trusted	Library can play a key role in building a strong sense of community: Empowerment model rather than deficiency model; Learning environment in which students feel connected, cared for, trusted; Team teaching with academic partners; Evaluate process and benefits to students; Celebrate success
6. Learning requires feedback, practice, and use Feedback -> sustained learning Practice -> nourishing learning Opportunities to use -> meaningful learning	Encourage goal setting; Provide information on progress towards meeting learning goals; Recurring process of needs analysis and improvement; Risk taking and learning form mistakes; Development of learners as constructive critics; Active problem solving and refining skills
7. Much learning takes place informally and incidentally Activities beyond classroom enrich formal learning experiences; Mentoring relationships beyond the classroom; Learning in a variety of setting and circumstances	Creative and imaginative approaches to instruction – not necessarily the group one-size-fits-all approach Rethink distribution of responsibilities: Information Literacy support staff; Library staff in mentoring relationships; Use of volunteers and activists; On-line help points: quick-fix
8. Learning is grounded in particular contexts and individual experiences Requires effort to transfer specific knowledge and skills to new circumstances; Grounded nature of learning: encounter alternative perspectives and other realities	Tailor education to individual rather than mass-produced delivery; Use of educational technologies as tool for collaborative learning; Understand factors which affect student cognition; Meet students on their turf; Curriculum co-ordination to contextualise learning experience; Challenge conventional views
9. Learning involves ability of individuals to monitor own learning Understand how knowledge is acquired; Know how to work with capacities and limitations; Awareness of own ways of knowing Ability to monitor own learning	Help students understand their strengths and weaknesses in learning; Help students observe and record their own progress in learning; Use of multiple pedagogies
10. Learning is enhanced by taking place in the context of compelling situations Provides challenge and opportunity Stimulates brain to conceptualise, contemplate and reflect Amplifies the learning process	Students learn more when: asked to tackle complex and compelling problems that invite them to develop an array of workable and innovative solutions; produce work to be shared with multiple audiences offered opportunities for active application of skills and abilities;

	placed in settings where they can draw on past knowledge and competencies

Conclusion

The current research on users' engagements with digital information environments, set against an understanding of recent research on learning, provides some significant opportunities for those engaged in information literacy instruction to reflect and critique current practices, understand emerging learning dilemmas, and to rethink how instructional design for information literacy might appropriately be undertaken. There is some clear evidence that information searchers are facing some real challenges and barriers to effective information seeking in digital environments. It is an important time for those engaged in formation literacy instruction to respond collaboratively, creatively and transformatively, based on an understanding of information needs and learning design, to ensure information seekers are able to engage meaningfully and purposefully in their information world. At the core of this is critically evaluating the educative role of the librarian somewhat beyond the mastery of databases, sources and collections, and, through a shared learning framework, examining how real value can be added to the real needs of information seekers.

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DEVELOPING IT LITERACY LEVELS AMONG LIBRARY STAFF IN A NETWORKED ENVIRONMENT, AT THE UNIVERSITY OF THE WITWATERSRAND (WITS), JOHANNESBURG, SOUTH AFRICA

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Introduction
IT literacy enables library staff to work efficiently in a wired networked environment, to provide user friendly service to a university community. Human factors in most IT environments may upset continuous workflow; some of these in the Wits University environment will be examined together with possible solutions. As well as addressing disruptive technological problems, the paper will show how the use of these networks, specifically the software, is a major factor affecting the level of service offered by Library staff. The three-way interaction of the networked environment, the library staff and the IT literacy levels of the staff will highlight the critical importance of maintaining high quality IT literacy training.

---> NETWORKED ENVIRONMENT

South African "wired" environment:
The South African environment is predominantly wired in nodes around the major centres throughout the country with the tertiary (i.e. higher) educational institutions linked through the University Network (Uninet). The underlying IP service is provided by the South African Telkom using modern ATM technology. Routing features work with SDN (Service Digital Network), Uninet and Telkom. There is still relatively small bandwidth in South Africa and often node problems, making Internet and email access slow at times and mediocre in efficiency.

Library staff in tertiary institutions are encouraged to use email, the Internet, integrated library systems and applications such as MSOffice. All Wits University Library staff have email and Internet access, and the Library has its own Web site, so a substantial degree of electronic communication and information retrieval operates in what is a physically decentralized Library and University system.

In South Africa electricity and telephone facilities in many areas experience cuts and downtimes. Staff wishing to use modem links from remote sites to the University's network cannot rely on consistently maintained access. In addition, the purchase price of, and duty on, (imported) home computer equipment is high.

Library staff require access to online catalogues in institutions throughout the country and internationally, either through the South African Bibliographic Network, SABINET, or directly. Direct access, even between members of the regional "Gauteng And Environs Library Consortium", GAELIC, is sometimes complicated by the firewalls that institutions have set in place for IT protection.

Other databases on library web sites, that are free or have been purchased locally or by consortia, may need access passwords. At present the Library is trying to make database access as transparent as possible via the Library Web site; passwords are still required for products with limited licences.

The IT networked environment is rapidly changing. Benefits of intensive IT literacy and skills training in a wider sense at the University would undoubtedly be improved performance, better user satisfaction and more job flexibility.

---> LIBRARY STAFF

IT background of Library staff working in an IT environment
The University Library has a staff of close on 150 persons, of whom approximately one third have professional qualifications; the legacy of former national policies of education and development in South Africa is seen in the high proportion of staff who, without formal post-school qualifications, come from the designated "previously disadvantaged" groups: black people and especially black women. The vast majority have English as a second, third or fourth language.

Library staff IT skills vary widely. Some have IT experience from home, school or specific certificated courses; others have little or no IT experience of any kind beyond the use of automatic banking (ATMs). As might be expected, those with home computers or IT literate family members, tend to be more open to learning more. Those with formal computer experience from school or college, but not at home, do have IT knowledge and with practise achieve good working levels of IT skill and literacy.

Many previously disadvantaged staff, however, especially those in their 30s, 40s or beyond, have neither computer exposure nor basic skills. Touchingly naïve comments by such staff on anonymous evaluation forms reflect enthusiasm and high expectations following even slight exposure to IT in basic Library staff training modules:

> *"I improved a lot compared to my previous experience and believe that in the next course I will be excellent;"*
>
> *"I love learning something new and interesting, especially the learning of the mouse;"*
>
> *"Because I know little about CDROM and it gave me interest in knowing more."*

At this less-skilled end of the IT literacy spectrum staff may also, in addition to the enthusiasm reflected in the comments above, be fearful of new skills needed, or may passively believe that the responsibility lies entirely with the more senior Library training staff. Levels of staff IT literacy rise all the time, through the exigencies of working in a highly networked environment, but nevertheless present constant challenges in the South African, and the Wits Library, context.

Perceptions of IT literacy among library staff:
Library staff assess their own levels of IT literacy needs in widely differing ways (as for example indicated in the comments quoted above). Initially most staff may identify particular IT skills needed to perform immediate daily work. For example a new desk staff member may ask to be shown initially how to issue books on the library system and then, as s/he is asked questions by users, may enquire about training to learn more, in order to meet users' expressed needs.

One of the challenges of the South African technological environment is a lack of awareness of the wider generic context and inter-relatedness of many routine skills. Staff unfamiliar with the wider scope of a system or resource, may not know what training to request. Staff familiar with email may request training to communicate more effectively; staff who are not, may prefer the familiar comfort of paper-based or telephonic communication until encouraged to attend training and practise new skills within the Library. Staff who have only accessed networked CDROM databases may be unaware of the full-text nature of newer electronic resources and limit their users accordingly. Staff may be afraid of making mistakes with IT, and so avoid acquiring more than absolutely essential skills. Inevitably there are also those who have picked up "bad habits" in the past and need to be "rehabilitated" to currently accepted practices in the library; and those who feel they know it all! This entire range of staff IT profiles needs to be taken into account in addressing training in the library.

IT TRAINING

University and Library Web sites provide both intranet access to internally generated information within the University, and database access, to all members of University staff and students from within the University domain. Library staff must access these sites to keep up-to-date with University news, and to

assist users in accessing the sophisticated electronic information resources made available at great cost by the Library through the GAELIC consortium. To perform successfully in this electronic environment, Library staff need individual and more structured but voluntary group training sessions.

The learning curve may be slow. As mentioned above, IT-disadvantaged staff not only struggle with specific IT skills but have to overcome fear, resistance and the insecurity of making "big mistakes" and possibly "losing face" in front of younger co-workers. Such barriers need to be addressed before progress can be achieved: until staff begin to feel comfortable in front of a computer and realise that they, not the machine, are the drivers, they tend to do without deviation only what is routinely required of them. This can lead to problems should the machine or the system present an unexpectedly different response to that which is familiar and expected.

MacLeod and Chiware (1993)1 have identified prerequisites for successful automation training as including a sufficient amount of training, extended areas of training beyond that required for the immediate job, high-level management involvement, and agreement that training be a continuing process.

Motivating staff
Staff participate in training for some or all of the following reasons:

- told to attend;
- invited to attend;
- wish or feel a need to attend;
- know co-workers have attended and benefited;
- ask for specific training;
- wish to learn for personal external reasons: e.g. promotional prospects, CV preparation, family email contact.

The relevance and anticipated transfer of training to particular work in the Library is always explicit in announcements of training sessions, so that staff can assess the advantage to themselves. Ultimately staff under pressure of work will attend IT training if they perceive, and subsequently experience, that training helps relieve pressure.

Despite such reasons, motivating staff to improve IT skills requires a complex and sensitive approach. In general, if staff do not perceive a benefit in a new skill, training may not achieve more than mediocre results in practice. The Library's Education and Training section also observe that staff with little IT experience find it hard to measure their own ability or need against the contents outline or pre-requirements of a given training module, and may not participate in training at the level most beneficial to themselves. Staff may obsessively and repeatedly attend every training session or, alternatively, participate in training for which they are under-prepared, and may lose because they may not actively use it on the job.

South Africa's past history of exclusion, however, makes it difficult to the point of being unacceptable to exclude any person from a training session which s/he wishes to attend, despite the fact that this may lead to an unproductive and difficult situation. An experimental attempt to set a simple skills exercise (the "mousercizer" tutorial) at the start of a training session, to separate levels of skills in participants, was greatly resented and abandoned.

For the same reason, motivation is highest with recognition of training. The Library is not in a position to certificate staff who attend 90-minute inhouse-designed training modules ("Basics", "Beyond Basics-1", "Beyond Basics-2"). Incentive and reward are conceptualised materially by many staff and the absence of material reward is often a disincentive. With the introduction since 1995 of a National Qualifications Framework (NQF) (www.saqa.org.za), it is however possible that even short training modules will be structured on a "unit standard" basis with a formal credit value. This will undoubtedly lead to better structured training and greater recognition.

---> IT LITERACY

Where knowledge is needed

- There may not be knowledge of what IT skills are available;
- skills may only be needed for an occasional or irregular task, once-off or once a year; (there may even be a conscious decision not to acquire such a skill but simply to ask for help each time);
- there may not be awareness of, or skill in, selecting and using the best application for a particular task
- an objective may be achieved but not in the most efficient or effective way;
- not believing that help is needed may lead to blaming the computer when things go wrong!
- preferring "I can't" as an avoidance tactic.

Training experience in the Wits University Library indicates that staff new to a system (library system, email, word processing etc) may develop rapidly in response to training at first but, once the basic routines required can be carried out, there often appears to be reluctance to train further. This may be due to boredom, work pressure or a real sense that no more knowledge or skill is needed. At this point on the learning curve extra motivation is needed to rekindle initial enthusiasm and sustain ongoing skills development.

Areas of IT literacy required in the Library

- Basic Windows and Internet generic screen and mouse skills; (although the majority of staff now possess these skills, they are sometimes at a rudimentary level without broader context);
- The Innovative Interfaces Inc., III, library system, installed three years ago;
- GroupWise email (recently converted from Pegasus);
- Internet management (Netscape, MS Internet Explorer);
- Library web site and linked electronic resources:
- eWITS OPAC
- Access to OPACs of other members of consortia;
- CDROM Databases;
- Electronic resources including full text databases and electronic journals;
- MSOffice networked applications as required;
- Highly specific individual software applications.

Gaps perceived in Library IT literacy:

- Management applications using features of the III system;
- Internet management;
- Accessing electronic resources and retrieving information from the Library Web site;
- Management of features of GroupWise email (beyond simple sending and receiving email);
- Skills and knowledge gaps revealed by staff surveys and performance appraisals, referred to E&T or LCS;

FACILITIES FOR RAISING IT LITERACY LEVELS

- External training (including subsidised participation in workshops, symposia and conferences):

  Individual members of Library staff may periodically require specialised IT training not available through the Library's Education & Training (E&T) or Computer Services (LCS) departments, nor the University's Computer Network Services (CNS). The cost of such training may be covered by the E&T budget, and may be subject to conditions that include a contract to continuing working in the Library for a given period after training, as well as a requirement to provide assistance to other members of staff who may need this.

- University CNS:

  The training unit of CNS advertises regular repeat training in general IT applications for current

University needs. The subsidised cost is borne by Library E&T. CNS also services a University-wide online help desk.

- Library E&T:

  E&T has one part time and two full time members of staff, and is responsible for coordinating and delivering user education and information literacy as well as staff training. Library-related IT training is designed and delivered to met the needs of ongoing Library IT development, requests by staff and management , or any skills perceived as necessary to staff development. E&T operates in two networked, console-linked electronic classrooms in the Library. These provide facilities for switching between on-screen demonstrations and hands-on practice sessions, for in-house and external training delivery. In 1998 and 1999 a total of over 90 training sessions were delivered in these ECRs, covering all the applications and systems described above.

- Library Computer Services (LCS):

  LCS delivers ECR-based staff training and individual assistance in specific technical areas on demand. In addition, LCS has designated "Area Filter Staff Members" (AFSMs), trained as first-level IT trouble shooters in Library departments, to identify minor IT problems and refer major issues to LCS. This practical approach is intended to reinforce Library staff IT skills. LCS also operates an email Library help desk.

- ASK-US inhouse list:

  An internal unmoderated list is administered within the Library on which problems, questions and answers are posted. "Tips" are edited and posted for ease of reference by all staff.

SPECIFIC APPROACHES TO IMPROVING IT LITERACY LEVELS

- Regular modular group training sessions in Library applications, building up skills from basic to more advanced levels of implementation; stressing importance of supervised practice on the job;
- providing training guidesheets and mini-manuals;
- constant monitoring and adjusting training to match Library needs;
- alerting department heads to the need for on the job reinforcement of training;
- encouraging interactive contributions to the ASK-US list;
- broadcasting global logon advice;
- encouraging the use of "tips" to be regularly edited on the Library intranet site;
- maintaining efficient individual assistance through the LCS Library help desk and person-to-person, including "talking through" technical problems by telephone;
- consulting outside commercial or expert help when appropriate;
- positive reinforcement of all IT skills and confidence-building through technical support.

CONCLUSION

From the wide-ranging account of the current state of IT literacy and training among the Wits University Library staff given in the preceding pages, the following points and suggested strategies emerge in summary and conclusion:

1. It cannot be assumed that a generally uniform IT-literate background culture, that will support new generations of Library IT implementation, exists for the majority of staff. Evaluating skills needs and developing training for such implementation, must include explicit recognition of this situation.

2. Introducing sophisticated IT on a wide scale in this library has required substantial and sustained training support, in groups and individually, to ensure optimum levels of application and utilization throughout the University community of users. Monitoring transferability, reinforcement on the job and building confidence, are essential.

3. Training should explicitly address known Library development needs and anticipate future needs in order to sustain confidence on the job. Training should always identify and stress the relevance of training to the work situation as well as personal skills development.

4. Motivation should include recognition of skills acquired and the Library should find ways of building in an incentive and reward system even if this cannot be a material reward.

References

1. MacLeod, R.A. and Chiware E.R.T. (1993): Lessons to be learned. Information technology training in a developing country academic library. *Library Management* 14 (6) 1993, 24-30

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